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PRELIMINARY NOTE ON A NEW PHARMACODYNAMIC ASSAY METHOD,

CARASSIUS AURATUS (GOLD FISH) AS TEST ANIMALS FOR THE DIGITALIS SERIES.

PAUL S. PITTENGER, PHAR. D., AND CHAS. E. VANDERKLEED, PHAR. D.

"The purpose of the pharmacodynamic assay just as of the chemical assay is to secure a means of measuring therapeutic activity and to make it possible to furnish *uniform* preparations. A satisfactory method which meets these requirements may or may not involve the production of physiologic reactions similar to those for which the drug is intended to be the means of producing when used therapeutically. That the effect chosen as a means of standardization does not parallel the clinical effect sought is not sufficient to condemn the method. It is only necessary that the effect chosen as an earmark is always indicative of a good quality of the drug or preparation, and criticisms of methods on the ground that they are *toxic* methods or that the animal chosen is biologically much different than man are made only through a lack of conception of the real purpose of the pharmacodynamic test, namely, to secure *uniformity*. The determination of the real value of a drug in the treatment of disease in man is another matter entirely."[1]

[1] Quoted from "Modern Methods of Drug Standardization," by Stewart, Hitchins, Elgin, Vanderkleed and Pittenger, Monthly Cyclopedia and Medical Bulletin, January, February and March, 1913.

Since biologic standardization was first proposed in 1898 the methods of assay employed for the digitalis series have been for the most part, not new but merely quantitative applications of the methods which had been used to elicit the drugs' actions. Of the many methods proposed, with their various modifications, there are only three which have been extensively used for standardization purposes, i. e., Houghton's "12 hr." frog method, Famulener and Lyons' "1 hr." frog method and Reed and Vanderkleed's guinea pig method.

Although the above methods all give more or less satisfactory results and have been revolutionary in that they have enabled the manufacturer to supply the physician with preparations of known and definite activity, there are still some things to be desired, first, a reduction in the cost of the assay; second, a more sensitive method, and third, a method simple enough that any competent pharmacist or physician can carry it out equally as well as the expert.

Just three weeks ago, one of the authors[2] conceived the idea of using fish as test animals by placing them in varying dilutions of the drug and noting the minimum dilution which will cause the death of the animal in a given time.

In experiments on frogs and guinea-pigs we have always been of the opinion that after taking care of the weight and temperature factors, the most important cause of animals' dying or recovering "out of order" is the marked variation in rate of absorption. The great absorptive power of the gills of a fish, together with the fact that they contain a large number of blood vessels through which the blood circulates direct from the heart, made this animal present itself as a possible means of eliminating these variations due to absorption.

Accuracy being the prime requisite for any assay method, it was first necessary, therefore, to determine whether or not the fish would die in direct proportion to the strength of the dilution in which they were placed. Accordingly the following experiment was carried out on gold fish.

Preparation Employed, Fld. Ext. Digitalis No. 1—Experiment No. 1.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Weight of Fish	Time Required to Cause Death
1— 750	0.4 cc.	25° C.	4.3 gm.	2 hours, 1 minute
1—1000	0.3 cc.	"	4.4 gm.	3 hours, 7 minutes
1—1250	0.24 cc.	"	2.5 gm.	4 hours, 59 minutes
1—1500	0.2 cc.	"	4.0 gm.	7 hours, 2 minutes
1—1700	0.192 cc.	21° C.	4.0 gm.	9 hours, 7 minutes
1—1800	0.166 cc.	"	3.4 gm.	21 hours, 3 minutes
1—1900	0.157 cc.	"	3.5 gm.	22 hours, 16 minutes
1—2000	0.15 cc.	"	3.2 gm.	24 hours, 58 minutes

The dilutions were made with "tap water," 300 cc. placed in an 800 cc. beaker and the fish added. No attention was paid to weight or temperature other than recording the same.

The experiment was repeated with tincture of digitalis, with the following result:—

[2] Pittenger.

Experiment No. 2.

Dilution	Actual Amt. of Tinct. Contained in 300 cc Water	Temperature	Weight of Fish	Time Required to Cause Death
1— 75	4.0 cc.	27—28° C.	3.2 gm.	2 hours, 17 minutes
1—100	3.0 cc.	" "	4.1 gm.	11 hours, 45 minutes
1—125	2.4 cc.	" "	3.8 gm.	16 hours, 45 minutes
1—150	2.0 cc.	" "	2.9 gm.	20 hours, 15 minutes
1—170	1.92 cc.	" "	3.7 gm.	24 hours, 20 minutes
1—180	1.68 cc.	" "	4.0 gm.	Recovered after 30 hours

It will be noted from the above results that, although in some cases the strength of the dilutions varied only 5%, *every* fish died in order in accordance with the dilution of the solution in which it was placed.

Next the variation between the strength of the dilutions was still further diminished in order to determine the limit of sensitiveness of these animals.

Preparation Employed, Fld. Ext. Digitalis No. 1—*Experiment No.* 3.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Weight of Fish	Time Required to Cause Death
1—1000	0.3 cc.	27° C.	4.4 gm.	2 hours, 23 minutes
1—1025	0.288 cc.	"	2.8 gm.	2 hours, 53 minutes
1—1050	0.285 cc.	"	3.3 gm.	3 hours, 40 minutes
1—1075	0.275 cc.	"	3.8 gm.	3 hours, 18 minutes

Preparation Employed, Fld. Ext. Digitalis No. 2—*Experiment No.* 4.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Weight of Fish	Time Required to Cause Death
1—1000	0.3 cc.	26° C.	3.0 gm.	1 hour, 20 minutes
1—1025	0.288 cc.	"	3.8 gm.	1 hour, 25 minutes
1—1050	0.285 cc.	"	3.2 gm.	1 hour, 36 minutes
1—1075	0.275 cc.	"	2.1 gm.	1 hour, 35 minutes

Preparation Employed, Fld. Ext. Digitalis No. 2—*Experiment No.* 5.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Weight of Fish	Time Required to Cause Death
1—1500	0.2 cc.	27.5° C.	2.8 gm.	1 hour, 15 minutes
1—1525	0.196 cc.	"	2.8 gm.	1 hour, 36 minutes
1—1550	0.194 cc.	"	3.0 gm.	1 hour, 10 minutes
1—1575	0.193 cc.	"	2.5 gm.	1 hour, 14 minutes
1—1600	0.187 cc.	"	3.4 gm.	1 hour, 38 minutes

Exp. No. 3 shows that with a variation as small as 2.5% in the strength of the dilutions, all but one fish died in order. Exp. No. 4 and 5, Fld. Ext. No. 2 (which was a preparation possessing greater activity than Fld. Ext. No. 1) show greater discrepancies. In this case, 3 of 9 fish died "out of order."

The facts that of Fld. Exts. No. 1 and 2, the weaker preparation gave the better results and that in Exp. No. 1 and 2 where the length of time required to cause

death was greater than in Exp. No. 4 and 5 (due to the use of a weaker preparation), not a single fish died "out of order," indicated that decreasing the strength of the dilutions would increase the sensitiveness of the test. The next experiments were, therefore, made with weaker solutions in order to prove this point.

Preparation Employed, Fld. Ext. Digitalis No. 2—*Experiment No.* 6.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Weight of Fish	Time Required to Cause Death
1—1850	0.162 cc.	28° C.	2.4 gm.	1 hour, 10 minutes
1—1900	0.157 cc.	"	3.1 gm.	1 hour, 27 minutes
1—1950	0.154 cc.	"	3.4 gm.	1 hour, 49 minutes
1—2000	0.15 cc.	"	2.9 gm.	1 hour, 57 minutes

Experiment No. 7.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Weight of Fish	Time Required to Cause Death
1—3500	0.0857 cc.	29° C.	3.1 gm.	2 hours, 58 minutes
1—3550	0.0845 cc.	"	4.0 gm.	3 hours, 55 minutes
1—3600	0.0833 cc.	"	4.2 gm.	3 hours, 48 minutes
1—3700	0.0810 cc.	"	3.8 gm.	4 hours, 30 minutes
1—3800	0.0789 cc.	"	4.6 gm.	6 hours, 6 minutes

These results show very clearly that decreasing the strength of the dilution prolongs the time required to cause death and thereby greatly increases the sensitiveness of the test. It will be noted that a variation of less than 3% in the strength of the dilutions, or, in other words, a difference of only 0.0021 cc. in the actual amount of Fld. Ext. contained in the 300 cc. water in which the fish were placed, caused a difference of one hour and 36 minutes in the length of time required to produce death.

That the weight of the fish is of no importance is clearly demonstrated by the fact that in the foregoing experiments, although some of the fish weighed more than twice as much as others, practically all died in the order of the dilution of the solutions in which they were placed.

In order to determine whether or not *large* variations in the weight of the fish would influence the results, the following experiment was carried out:—The size of the large fish used made it necessary to place each animal of the series in 1000 cc. of the dilution instead of 300 cc., as was used in the preceding experiments.

Preparation Employed, Fld. Ext. Digitalis No. 2—*Experiment No.* 8.

Dilution	Temperature	Weight of Fish	Time Required to Cause Death
1—1000	27.5° C.	34.1 gm.	58 minutes
1—1000	"	27.9 gm.	52 minutes
1—1000	"	5.5 gm.	59 minutes
1—1000	"	5.0 gm.	47 minutes
1—1000	"	2.3 gm.	54 minutes
1—1000	"	3.1 gm.	55 minutes

It will be noted that, although the largest fish weighed *more than ten times as much as the smallest,* the length of time required to cause death, when immersed

in solutions of the same strength, varied but 12 minutes. These results would tend to prove conclusively that the weight of the animal can be disregarded when making tests by this method.

It was noticed that, although each series of dilutions gave concordant results within 2½%, there was a variation between the different series, in the length of time required to produce death by solutions of the same strength. This discrepancy suggested a variation due to differences in temperature. The following table shows the results of an experiment to determine the effect of temperature on the resistance of gold fish:—

Preparation Employed, Fld. Ext. Digitalis No. 2—*Experiment No.* 9.

Dilution	Temperature	Weight of Fish	Time Required to Cause Death
1—1000	38 to 39° C.	4.7 gm.	46 minutes
1—1000	26.5 to 27° C.	4.2 gm.	2 hours, 55 minutes
1—1000	12 to 17° C.	3.9 gm.	7 hours, 21 minutes

It is apparent from this single experiment that temperature is of the utmost importance and that in order to obtain concordant results it will be necessary to carry out all assays at exactly the same temperature. This can easily be accomplished, however, by immersing the beakers containing the dilutions in a constant temperature bath. The best temperature to employ still remains to be determined.

Next eight fish were placed in beakers, each containing exactly the same strength solution in order to determine the individual variation in susceptibility.

Preparation Employed, Fld. Ext. Digitalis No. 2—*Experiment No.* 10.

Dilution	Actual Amt. of F. E. Contained in 300 cc. Water	Temperature	Time Required to Cause Death
1—3500	0.0857 cc.	28.5° C.	2 hours, 47 minutes
1—3500	0.0857 cc.	"	3 hours, 12 minutes
1—3500	0.0857 cc.	"	3 hours, 18 minutes
1—3500	0.0857 cc.	"	2 hours, 59 minutes
1—3500	0.0857 cc.	"	2 hours, 43 minutes
1—3500	0.0857 cc.	"	3 hours, 8 minutes
1—3500	0.0857 cc.	"	3 hours, 4 minutes
1—3500	0.0857 cc.	"	2 hours, 51 minutes

The last fish died 35 minutes after the first one. For comparison 8 guinea pigs were injected with exactly the same dose (1½ times the usual m. l. d.) per 250 gm. body weight, and it was found that the sixth pig died 1 hr. and 28 minutes after the first. The remaining two pigs were still alive at the end of 12 hours. I was unable to obtain frogs in time to make a comparison with these animals, but it is generally admitted by most workers that the variation in frogs is more marked than in guinea pigs.

In experiment No. 2 with tincture digitalis, the presence of the alcohol which was not removed did not interfere with the results. It was possible, however, that the alcohol might have increased or decreased the length of time required to cause death for the whole series. Fish were, therefore, placed in four 1-1000 dilutions of Fld. Ext. Digitalis; two with 1.5 cc. alcohol added (the amount which would be

contained in 3.0 cc. Tinct Digitalis) and two without alcohol. The results follow:—

Experiment No. 11.

Dilution	Time Required to Cause Death
1—1000 without alcohol	2 hours, 35 minutes
1—1000 without alcohol	2 hours, 20 minutes
1—1000 1.5 cc. alcohol added	2 hours, 7 minutes
1—1000 1.5 cc. alcohol added	2 hours, 27 minutes

It would appear from the above results that alcohol to the extent of that contained in the U. S. P. tincture does not affect the results. More extensive experiments, however, are necessary before definite conclusions may be drawn in regard to this point.

The time being limited, it was impossible to carry out all the experiments which suggested themselves in time for this preliminary report. We shall, therefore, continue our investigations in an endeavor to determine the following:—

1. The best time limit and,
2. The most suitable dilution, leading to
3. Tentative standards.
4. Action of other members of the digitalis group.
5. Extent of seasonal variations.
6. Best temperature to employ.
7. More extensive experiments on the effect of alcohol.
8. The possibility of the application of this method to standardizing biologic products, such as antitoxins, sera, etc.

SUMMARY.

The results of the foregoing experiments, together with experience with other methods so far proposed, lead to the following conclusions:—

1. Gold fish are sensitive to variations of 2½% in the strength of the dilutions of digitalis in which they are placed.
2. Variations due to differences in the rate of absorption appear to be practically eliminated by the use of these animals.
3. Decreasing the strength of the dilution, increases the sensitiveness of the test.
4. The weight of the fish may be disregarded when making tests by this method.
5. Variations in the temperature markedly influence the resistance of gold fish to digitalis poisoning.
6. The individual variation in the susceptibility of gold fish is much less than that found in guinea pigs and frogs.
7. The gold-fish method is unquestionably the simplest so far proposed and can easily be carried out by those not especially skilled in the pharmacodynamic art.
8. The inexpensiveness of the assay is decidedly in its favor. Gold fish of the proper size can be purchased wholesale for from 45 to 60 cents per dozen.
9. A sufficient number of animals can be procured at all seasons of the year.

Pharmacodynamic Laboratory, H. K. Mulford Company, August 20, 1914.

DISCUSSION.

DR. EDWARD KREMERS:—Is the application of this method new in this country?

DR. PITTENGER:—New, so far as I know.

DR. KREMERS:—Gold fish have been used in other work?

DR. PITTENGER:—Yes, I think they have been used in other work, but so far as I am acquainted with the literature this is the first attempt that has been made to use these animals as a means of quantitatively testing the activity and thereby standardizing galenical preparation or antitoxins.

DR. KREMERS:—I think Dr. Stockberger could tell us something about that. Is he here in the room? Dr. R. H. True worked with gold fish along similar lines some years ago before he went to work in the Department of Agriculture.

DR. STOCKBERGER:—Yes, both Dr. Kahlenberg and Dr. True have conducted work with fish and tadpoles along somewhat similar lines, but the application, of course, was in an entirely different direction. The fish were used merely as a reagent, you might say, in testing the toxicity of various chemical solutions. I do not know that this method has been used in testing galenicals prior to Dr. Pittenger's work.

DR. KREMERS:—The principle was different.

DR. STOCKBERGER:—The principle was different, but the use practically was very similar.

MR. A. J. MEIER:—I would like to ask whether any experiments were carried out to determine whether or not the fish would live from twenty-two to twenty-four hours if left in ordinary water without changing at room temperature when such small amounts of water were employed?

DR. PITTENGER:—No. Such experiments were not necessary as Experiment No. 2 shows that one fish was still alive after being kept for thirty hours in only 300 cc. of a 1-180 dilution of tincture of Digitalis. Table No. 1 also shows that some fish lived for twenty-two to twenty-four hours in this amount of solution.

MR. MEIER:—Without any change of water, or getting oxygen in the water?

DR. PITTENGER:—Yes. It would not be advisable, however, to employ so small a quantity of solution if twenty-four hours should eventually prove to be the best time limit. As stated in the paper the best time limit has not yet been determined. The 300 cc. of solution were merely arbitrarily adopted at the beginning of the experiment when I had no idea as to the length of time which would be required for the fish to die when placed in the different strength solutions employed. It merely happened that some of these fish lived for twenty-four hours. If this should eventually be chosen as the time limit the quantity of the dilution would necessarily have to be increased. The fact that one fish recovered after twenty-four hours shows that such factors had no apparent effect in this time and that by using a shorter end point their effect would be practically *nil*.

DR. KREMERS:—Wasn't the fish which recovered seemingly dead? Is it hard to tell just when a fish dies?

DR. PITTENGER:—No it wasn't. Apparently it was just as much alive as when placed in the solution. It is very easy to note when a fish dies. It generally first turns over on its side and a little later becomes motionless.

DR. KREMERS:—Did you try to see if you could revive those which were seemingly dead by putting them in salt water?

DR. PITTENGER:—No, I did not as that would have interfered with our results. I know however, that gold fish breeders revive their sick fish by that method.

EXAMINATION OF CALYCANTHUS FLORIDUS FOR ALKALOIDS.

E. R. MILLER AND H. W. BROOKS.

One of the widely-known and popular plants indigenous to the Southeastern States, is *Calycanthus floridus*, a shrub from 2 to 8 feet high, growing from Virginia to Florida and Alabama.

Its chief characteristic, which has won for it almost first place among the wild flowers, is not the size and beauty of its blossoms, but rather their delightful fragrance. To this it owes the almost universal name of "Sweet Shrub."

As a medicinal plant it is not of much importance, but is said to be antiperiodic, stimulant and tonic. The bark has an agreeable, spicy, camphoraceous odor which no doubt suggested the names Carolina allspice, Florida allspice. etc.

Inasmuch as alkaloids have been discovered in the seeds of another species of

the genus, namely, *Calycanthus glaucus*,* we decided to make an examination of the flowers, leaves and roots of the species *C. floridus*.

The roots were dried before extracting, but the flowers and leaves were used in the fresh condition.

About 200 gm. of each of the parts named were extracted by maceration with 95% alcohol which had been distilled over tartaric acid. The filtered alcoholic extract was distilled on a water bath until the greater part of the alcohol had been removed. The residue was then treated with water until no further precipitation resulted. The resinous and oily matter was removed by filtration and the filtrate evaporated to a small volume on a water bath. In the case of the root this aqueous extract was rather milky in appearance, and was cleared up by shaking out with ether. The aqueous liquid was then made slightly alkaline with ammonia and extracted in succession with ether, chloroform, petroleum ether and benzene. After evaporation of the immiscible solvent the residue was treated with a small amount of water acidulated with dilute H_2SO_4, and tested with general alkaloidal reagents. The following results were obtained:—

SOLUTION FROM ETHER EXTRACT.

	Roots	Flowers	Leaves
Potass mercuric iodide	Slight ppt.	Yellowish White ppt.	Heavy White ppt.
Co. Solution iodine...	Reddish ppt.	Heavy Brown ppt.	Red ppt.
Potass Bismuth iod..	Red ppt.		
Tannic acid.....	No ppt.	No ppt.	No ppt.
Phosphomolybdic acid	No ppt.	No ppt.	Heavy White ppt.
Picric Acid.....	No ppt.	Yellow ppt.	Yellow ppt.

The chloroformic extract of the flowers gave precipitates with phosphomolybdic acid and solution iodine compound. The petroleum ether extract of the flowers gave a ppt. with sol. iod. comp. The benzene extract of the leaves gave a white ppt. with potass. mercuric iod.; a red ppt. with sol. iod. co. and a greenish-yellow with picric acid, and the ether extract from the leaves gave a heavy white ppt. with potass. mercuric iod.; a red ppt. with co. sol. of iodine; a heavy white ppt. with phosphomolybdic acid and a yellow ppt. with picric acid.

The results obtained make it highly probable that the plant contains alkaloids, especially in the leaves, the extract from which produced the most abundant precipitation with the alkaloidal reagents. Considering the nature of the solvents used in preparing the solutions to be tested it is scarcely probable that enough protein matter could have been present to give the abundant precipitation that was obtained in several cases.

The subject will be further investigated as soon as sufficient material can be obtained.

Alabama Polytechnic Institute.

* Dr. R. G. Eccles, Proc. Am. Pharm. Assoc., 1888, 84, 382.
Dr. H. M. Gordin, Proc. Am. Pharm. Assoc., 1904, 345; 1905, 224; 1908, 805; 1909, 889.
Jour. Am. Chem. Soc., 1905, 144.

THE ANALYSIS OF CIGARETTES, CIGARS AND TOBACCO, AND THE USE OF LLOYD'S REAGENT IN THE DETERMINATION OF NICOTINE.

AZOR THURSTON.

INTRODUCTION.

Some six months ago while in conversation with Hon. S. E. Strode, Commissioner in charge of the Dairy and Food Division of Ohio, the question of adulteration of cigarettes and other tobacco products came up and the statement was made by some one present that large quantities of tincture of opium were being purchased by manufacturers of this line of goods. An investigation was therefore ordered, not only as to opium, but as to medicinal substances in general. It fell to the lot of the writer to make whatever investigation as was deemed necessary.

The most natural thing to do was to look up the literature on the subject and, to my surprise, I was unable to find a published account of the analysis of cigarettes or cigars, although other tobacco products were fairly covered in reference to nicotine and some other constants. I therefore wrote to the Bureau of Chemistry, U. S. Department of Agriculture, where one naturally expects to obtain methods of analysis of practically everything, and again I was doomed to disappointment, the reply indicated that methods had not been developed for making analyses of cigarettes, although the department had made a few examinations of cigarettes with the view of determining whether or not they contained opium or arsenic.

I found in Wiley's Agricultural Analysis[1] a statement in reference to opium and cigarettes as follows:—"It is believed, however, that opium is not often found in manufactured tobacco, and it has never been found in this laboratory in cigarettes, although all the standard brands have been examined for it."

I at once took the matter up with Dr. Wiley by correspondence, and received a reply as follows:—

"As far as I know opium, arsenic, etc., have never been found in cigarettes. This is a rumor which is constantly being floated, but is without general foundation. The cigarettes are harmful enough in themselves without seeking this extreme evil in them. None of the results referred to were ever published as far as I know. You can perhaps get more definite information concerning this investigation from Mr. McElroy himself, as he is a practicing chemical patent attorney in this city. The address is K. P. McElroy, 918 F Street. I have no special data on the subject of the cigarette evil, but am unalterably opposed to the use of tobacco in any form, as I consider it an unclean, unhealthy habit which diminishes the vitality and the efficiency of the user, and is, moreover, an imposition on the public who do not use it."

Upon receipt of Dr. Wiley's letter it appeared I would corner the information I most desired, and I immediately wrote to Mr. McElroy for more light upon the subject. He promptly replied as follows:—

"I regret to say that I can give you very little information concerning the analyses of cigarettes at the present day. What analytical work I did was done very many years ago and the results were never published to my knowledge, having been made for the information of a congressional committee.

"About all I remember of the matter at present is that in the twelve or thirteen brands I analyzed I did not, of course, find morphine, arsenic, and other alleged ingredients. Neither did I find Alfalfa, a common rumor to the contrary notwithstanding. I found considerably more nicotine than expected."

[1] Wiley's Agricultural Analysis, Vol. III, 597.

During this correspondence the inspectors had delivered to me a number of samples for analysis, and I decided to begin the investigation along lines that appeared most desirable the details of which follow.

Preparation of Samples:—The samples were not dried except as they were kept in the laboratory at a temperature of about 25° C. Any attempt at artificial drying might be at the sacrifice of nicotine and was, therefore, not attempted. The samples were next powdered, so as to pass through a number 20 sieve. If finer so much the better, but it is some difficulty to obtain a powder of this fineness, even after passing the sample through a meat-chopper several times. In case of cigarettes the papers were removed and all particles of the filler carefully dusted off so as to obtain the papers as free from the filler as possible. Separate analyses being made of the papers.

The Analysis:—Determinations were made as follows:—Nicotine, ash, water soluble ash, water insoluble ash (by difference), hydrochloric acid insoluble ash, alkalinity of water soluble ash, alkalinity of water insoluble ash, opium and other drugs.

The same determinations were made of the papers, except for nicotine, and further tests were made for nitrates in the papers.

RESULTS OF ANALYSIS OF TWO BRANDS OF CHEAP CIGARS.

No.	Brand	Nicotine	H_2O Sol. Ash	H_2O Ins. Ash	HCL Ins. Ash	Total Ash	Ash H_2O Sol. Ash	Alk. H_2O Ins. Ash	Total Alka-Ash
4536	Cobs	1.48	7.15	14.88	2.36	22.03	4.15	28.85	33.00
4539	Havana Plumes	1.26	5.83	14.58	4.27	20.41	3.60	29.90	33.50
Average		1.37	6.49	14.73	3.31	21.22	3.87	29.38	33.25

RESULTS OF ANALYSIS OF THREE SAMPLES OF TOBACCO LEAVES WITH MIDRIBS REMOVED.

No.	Habitat	Nicotine	H_2O Sol. Ash	H_2O Ins. Ash	HCL Ins. Ash	Total Ash	Alk. H_2O Sol. Ash	Alk. H_2O Ins. Ash	Total Alkalinity Ash
4540	Ohio	3.34	8.42	13.76	2.33	22.18	4.80	24.55	29.35
4611	Vir.	3.38	5.17	6.79	2.04	11.96	4.15	9.95	14.10
4612	Vir.	2.41	3.97	8.39	2.49	12.36	1.55	13.05	14.60
Average		3.04	5.85	9.65	2.29	15.50	3.50	15.85	19.35
Ribs from 4540		1.48	9.53	8.82	.43	18.35	6.40	18.20	24.60

No. 4612 was a bleached tobacco used for the manufacture of cigarettes.

METHODS OF ANALYSIS.

Nicotine:—As the amount of nicotine present determines the strength of the tobacco this estimation is of great importance.

Numerous methods have been proposed for the determination of nicotine, but they all practically are included in three divisions.

The Kissling[2] method is the official method of the Association of Official Agricultural Chemists and consists in making the sample alkaline and extracting with

[2] U. S. Dept. Agr. Bureau of Chemistry Bulletin 107 (Revised), 32.

RESULTS OF ANALYSIS OF TWENTY-SIX BRANDS OF CIGARETTES.

No.	Brand	Nicotine	FILLER.							PAPERS.						
			H_2O Sol. Ash	H_2O Ins. Ash	HCl Ins. Ash	Total Ash	Alk. H_2O Sol. Ash	Alk. H_2O Ins. Ash	Total Alkalinity Ash	H_2O Sol. Ash	H_2O Ins. Ash	HCl Ins. Ash	Total Ash	Alk. H_2O Sol. Ash	Alk. H_2O Ins. Ash	Total Alkalinity Ash
4521	Nebo	2.03	3.46	18.34		21.80	1.53	12.18	13.71	3.21	14.30		17.51	6.03	26.60	32.63
4522	Fatima	2.79	3.53	11.15	2.69	14.68	1.56	13.42	14.98	1.02	18.79		19.81	.99	40.79	41.78
4523	Hassan*	1.94	3.73	12.83	4.31	16.56	2.35	7.40	9.75	.92	17.36	2.24	18.28	1.06	51.57	52.63
4524	Sweet Caporal.....	2.05	3.02	10.49	4.90	13.51	.97	11.53	12.50	.96	1.06		2.02	3.25		3.25
4525	Nebo*	1.93	4.03	11.71	3.20	15.74	1.98	18.38	20.36	2.29	14.13	.36	16.42	5.59	29.96	35.55
4526	Helmar	1.56	4.67	13.74	.02	18.41	3.89	22.69	26.58	.48	17.10	.02	17.58	.69	26.74	27.43
4527	Mogul*	1.45	3.81	10.94	1.55	14.75	1.87	19.61	21.48	1.78	15.31		17.09	5.30	34.08	39.38
4528	Egyptian*	1.59	4.09	14.74	3.15	18.83	2.72	24.40	27.12	1.08	17.16		18.24	1.83	36.26	38.09
4529	Omar	1.98	3.64	10.74	2.84	14.38	2.35	18.44	20.79	4.19	14.02	.45	18.21	.37	35.51	35.88
4530	Mural	1.52	3.48	12.92	2.13	16.40	3.71	22.87	26.58	1.04	16.72	.44	17.76	2.38	38.71	41.09
4531	Royal Nester.....	1.47	3.68	14.65	3.14	18.33	2.10	21.85	23.95	.47	17.94	2.88	18.41	.87	37.63	38.50
4532	Turkish Trophies...	1.44	4.08	12.92	2.68	17.00	3.00	18.95	21.95	1.90	16.36	.25	18.26	6.34	33.88	40.22
4533	Home Run‡.....	1.89	5.69	13.79	3.06	19.48	4.25	22.40	26.65	.93	4.04	.78	4.97	1.98	9.18	11.16
4565	Home Run‡.....	1.67	5.48	12.87	2.30	18.35	4.25	22.50	26.75	1.60	2.95		4.55	4.01	8.63	12.64
4566	Home Run‡.....	1.78	6.06	13.41	2.31	19.47	4.60	27.95	33.55	1.11	3.58	.74	4.69	3.72	9.51	13.23
4534	Piedmont‡	3.34	3.06	8.92	2.72	11.98	.45	13.05	13.50	.94	4.29	.72	5.23	1.59	7.60	9.19
4535	Zubelda	1.97	3.63	10.68	1.93	14.31	2.28	18.55	20.83	1.49	20.63	.18	22.12	2.51	44.04	46.55
4537	LaLucbana‡	.43	6.92	15.01	2.12	21.93	6.50	23.60	30.11	2.16	10.25	1.13	12.41	2.03	21.61	23.64
4538	Tareyton	1.75	3.67	10.51	1.66	14.18	1.36	18.39	18.75	.29	15.45		15.74	1.74	29.79	31.53
4558	Egyptienne Luxury..	1.60	3.88	12.11	2.03	15.99	2.75	20.00	22.75	.76	19.45	.59	20.21	1.23	52.87	54.10
4559	Fifty-six	1.43	3.27	12.23	2.09	15.50	3.10	19.45	22.55	2.17	14.19	1.92	16.36	6.39	30.68	37.07
4560	Rameses	1.73	3.14	13.50	3.16	16.64	1.85	20.20	22.05	1.75	12.13		13.88	3.99	30.46	34.45
4561	Schinasi	1.51	3.48	14.22	2.29	17.70	2.60	23.85	26.45	1.76	19.84	4.66	21.60	2.88	40.61	43.49
4562	Condax‡ †	1.06	3.30	11.67	1.83	14.97	2.50	20.50	23.00	1.53	15.39	.18	16.92	3.26	45.64	48.90
4563	Egyptian Straights...	1.45	3.98	13.70	2.67	17.68	2.50	22.80	25.30	2.86	15.09		17.95	7.61	36.45	44.06
4564	Egyptian Arabs.....	1.35	3.54	14.99	3.25	18.53	2.65	22.70	25 35	2.09	11.64	2.38	13.73	6.19	27.72	33.91
4579	Makaroff	1.21	1.02	15.65	2.48	16.67	2.50	22.00	24.50	.62	10.64	.41	11.26	1.03	26.61	27.64
4610	Phillip Morris & Co.	1.48	3.50	13.44	3.10	16.94	2.00	20.50	22.50	1.88	15.18	.18	17.06	3.27	39.21	42.48
	Average	1.69	3.89	12.92	2.13	16.81	2.64	19.65	22.29	1.54	13.39	.73	14.93	3.15	30.44	33.59

* Cork Tips.
‡ Responds to the test for nitrates in the papers.
† Straw Tips.

ether, evaporating the ether, and distilling the extract in a current of steam. The distillate is titrated with standard acid.

The Keller[3] method—The nicotine is extracted with proper solvents and air passed through the extract, to expel ammonia, and the extract finally titrated with standard acid.

The Bertrand & Javillier[4], or Silicotungstate method—As in the Kissling or similar methods the nicotine is extracted from the tobacco and the extract distilled in a current of steam and then the nicotine precipitated from the distillate as nicotine silicotungstate, a rose white salt with the following formula:—$2C_{10}H_{14}N_2$ $2H_2O$ SiO_2 $12WO_3 + 5H_2O$. This salt on being ignited leaves a residue or SiO_2 and WO_3 from which is calculated the weight of nicotine originally present. This method of analysis was used for the determination of nicotine as herewith tabulated except the first extracting was omitted and the nicotine determined in the tobacco by directly distilling in a current of steam and following out Chapin's[5] directions modified to read as follows:—Weigh out exactly 5 grams of the sample and wash, with about 25 cc. of water, into a 500 cc. Kjeldahl flask; add 1 to 1½ grams of paraffin, a few small pieces of pumice and 5 cc. saturated solution of sodium hydroxide. Distil in a rapid current of steam, through a condenser and adapter, into 10 cc. of dilute hydrochloric acid (¼) into a 1500 cc. flask. When distillation is well started, apply heat to the distilling flask so as to keep the volume as low as practical. Distil until the distillate measures about 1000 cc., or when treated with a drop of silicotungstic acid and a drop of hydrochloric acid no opalescence is produced. Make the distillate up to exactly 1000 cc., or some other convenient volume, with distilled water. Filter and place 100 cc. of filtrate in a 250 cc. beaker and add 3 cc. dilute hydrochloric acid (¼) or more if necessary to make the solution distinctly acid. Add 1 cc. of a 12 *per cent.* solution of silicotungstic acid for each 0.01 gram nicotine supposed to be present. Stir thoroughly and let stand for eighteen hours. Filter on an ashless filter and wash with dilute hydrochloric acid, 1 cc. concentrated acid to 1000 cc. water, until the filtrate is free of silicotungstic acid. Transfer the wet paper and precipitate to a weighed platinum crucible, using a scrap of moistened filter paper to transfer any precipitate which may have crept up the sides of the funnel; dry, carbonize and break up the precipitate with a platinum wire and finally cover the crucible and apply full heat of a Bunsen burner for fifteen minutes. Cool in a desiccator and weigh. The weight of the residue multiplied by 0.114 afford the nicotine in the aliquot taken for precipitation, and from this amount the percentage may be calculated.

Instead of precipitating with silicotungstic acid Emery[6] proposed to determine the amount of nicotine in the distillate by polarization and others have proposed to precipitate the nicotine with mercuric potassium iodid. It appears to the writer that the silicotungstic method is less liable to errors and it is susceptible of concordant results on duplication.

THE USE OF LLOYD'S REAGENT IN THE DETERMINATION OF NICOTINE.

This is merely a preliminary report on the determination of nicotine with Lloyd's Reagent as lack of time has prevented a thorough investigation, although

[3] J. Chem. Soc., 1899, Vol. 76, II, 193. Pro. A. Ph. A., 1900, Vol. 48, 392.
[4] J. Chem. Soc., 1909, Vol. 96, II, 450. Chem. Abs., 1909, Vol. 3, 1382 and 2103.
[5] U. S. Dept. Agr. Bureau of Animal Industry Bulletin 133.
[6] J. Am. Chem. Soc., 1904, Vol. 26, 1113.

sufficient work has been done to predict that a successful method might be worked out.

So far I have been unable to make close duplications and without going into details as to the different experiments made I will give the amount of nicotine found by the use of Lloyd's Reagent and by using silicotungstic acid:—

No.	Silicotungstic Method	Lloyd's Reagent
4524	2.05	1.80
4525	1.93	1.99
4527	1.45	1.99
4530	1.52	1.18
		2.06
4528	1.59	1.65
4535	1.97	1.51
4529	1.98	1.75
		1.99
4532	1.44	1.97

There have been a number of interesting articles[7] published in reference to Lloyd's Reagent which should be read by interested parties.

All methods of extracting the alkaloids of tobacco, includes the four alkaloids,—nicotine, nicotimine, nicoteine, and nicotilline. The three latter existing in such small quantities that they do not make much practical difference and usually the total amount of alkaloids extracted from tobacco is considered nicotine; however, as nicotine and nicotimine are volatile in a current of steam and the other two are not, by the distillation method the two non-volatile alkaloids are eliminated.

I find sulphomolybdic acid gives a blue coloration with nicotine, which might be easily mistaken for morphine, as practically the same coloration is produced with this reagent with both alkaloids. A drop of the reagent should be directly applied to the pure nicotine or to the solids containing nicotine—such as tobacco and tobacco extracts. The color is produced more rapidly if the substance is slightly warmed.

Ash:—Weigh exactly 2 grams of the sample in a platinum pan and incinerate. Any particles carbon can be removed by adding a few drops of water to the ash and after drying ignite for a few minutes. The average ash obtained from three samples of leaf tobacco was 15.50, from two samples of cigars 21.22, and from twenty-eight samples of cigarettes 18.81 *per cent.*

Alkalinity of Water-Soluble and Water-Insoluble Ash:—The water-soluble ash is determined by dissolving, in hot water, the soluble portion from the ash as above determined and titrating with N/10 acid, using methyl orange as indicator. The alkalinity of water-soluble ash is reported as the number of cubic centimeters of decinormal acid required to neutralize the ash from one gram of the sample.

The water-insoluble ash is dissolved in 5 cc. normal hydrochloric acid and the excess of acid estimated by titrating with decinormal alkali. The number of cubic centimeters of decinormal alkali used deducted from 50 will give the alkalinity of the water-insoluble ash. In a few cases it will be necessary to use 10 cc. normal acid as the alkalinity occasionally runs very high.

Hydrochloric Insoluble Ash:—Is determined by adding concentrated hydrochloric acid to the solution after determining alkalinity of the water-insoluble ash. Pass the bulk of the solution through an ashless filter and add concentrated hydro-

[7] J. Am. Chem. Soc., 1913, Vol. 35, 837. Am. Druggist, 1913, Vol. 61, 234. J. Am. Ph. Association, 1914, Vol. 3, 625-630.

chloric acid to the residue and wash the insoluble portion on the filter with distilled water. Incinerate the filter with residue in a platinum crucible. Cool, and weigh.

Opium and Other Drugs:—Macerate a few grams of the sample with alcohol for two or three hours. Filter and evaporate the filtrate to dryness. Extract the residue with dilute sulphuric acid and complete the investigation by shaking out according to Fuller's[8] scheme of analysis for separation and detection of substances in medicinal products.

The current report is that cigarettes contain opium or some form of "dope"; however, the brands I examined were free of added medicinal substances, barring calcium, magnesium and nitrates found in the papers.

Referring, again, to sulphomolybdic acid test for nicotine, I wish to call your attention to the fact that morphine might be easily mistaken for nicotine. For instance, after shaking out the alkaline solution with petroleum ether, for nicotine, and then with a mixture of chloroform and alcohol (2 : 1) for morphine and evaporating the solvent I added a drop of sulphomolybdic acid to the residue and a blue color was at once produced, indicating morphine. As the brand of cigarettes tested was manufactured by a company of high reputation it did not appear probable they would use opium in their goods. Therefore, I extracted the nicotine from a distillate of known purity and applied sulphomolybdic acid to the residue and the blue coloration was at once produced.

If, for any reason, only one test is to be applied to the extract for the detection of morphine, use formaldehyde-sulphuric acid (10 cc. formaldehyde solution to 50 cc. concentrated sulphuric acid). A deep purple color indicates morphine and no coloration is produced with nicotine.

CIGARETTE PAPERS.

So far as I know nearly all cigarette papers have chemical fillers added, presumably to improve their burning qualities; however, if the ingredients are harmless there should be no particular objection to their use.

Prominent manufacturers kindly furnished the analysis of two brands of cigarette papers and, as I have not been able to find this subject covered in the published literature I consider them of sufficient interest to reproduce same in this paper.

"ANALYSIS OF CIGARETTE PAPERS.

	Austrian	French
Moisture	4.30	4.62
Ash		
Calcium oxide	4.95	5.12
Magnesium oxide	88.80	84.02
Iron, alumina and silica exides	4.00	4.68
Chlorides	trace	trace
Nitrates	none	none
Sodium and potassium salts	trace	trace
Fiber	linen	linen
Organic fillers	starch	starch
Soluble constituents	alkaline	alkaline
Carbonates in filler as CO_2, at least	2.00	2.00

REMARKS.

"The papers were all what would be technically known as 'very moderately' sized as they carry small amount of starch, along with the filler which was composed of varying amounts

[8] Fuller's Qualitative Analysis of Medicinal Substances.

of calcium, aluminum and magnesium oxides and carbonates. There was also present small amounts of iron and silica which would be present from the wash water used in the preparation of the pulp or in many other ways.

"The fiber present in the pulp was found to be composed of linen, very well pulped except for a very few bunches of undigested or unbeaten fiber which it is impossible to overcome. No test for other fibers was obtained. No acids, sulphur compounds or chlorine was found which might have come from the process of manufacture. The paper gave an alkaline reaction due to the filler used which was composed of calcium, aluminum and magnesium carbonates and oxides. The carbonates present were equal to at least 75% of the ash and probably more, but it was impossible to determine this very accurately. No impurities other than those mentioned were found. The moisture found was of varying weight, due to the fact that paper of the variety examined has a tendency to hold moisture proportionate to the humidity of the atmosphere of the date of examination."

I wish to call particular attention to the small amount of ash shown by these analyses compared with the amount actually found by the writer in twenty-eight samples which yielded an average percentage of 14.93.

NITRATES IN PAPERS.

It appears that the majority of manufacturers object to paper containing nitrates.

Nitrates may be detected by applying the diphenylamine test as follows:—Take one drop diphenylamine test solution on a glass rod and draw the rod lightly and quickly across the paper. Hold the paper to the light and within five or ten seconds a blue coloration is produced in case nitrates are present. If a large quantity of the nitrate is present the coloration forms immediately. The diphenylamine test solution may be prepared after Withers & Gray's formula,[9] which is as follows:—0.7 gram of diphenylamine is dissolved in 60 cc. concentrated sulphuric acid and 28.8 cc. of distilled water. The mixture is thoroughly cooled and 11.3 cc. concentrated hydrochloric acid are added slowly.

The papers of only four brands out of twenty-eight tested, responded to this test for nitrates.

In closing, I wish to acknowledge the helpful suggestions of Prof. John U. Lloyd while experimenting with Lloyd's Reagent; also to those who kindly and promptly replied to my letters when seeking information on certain points and to the manufacturers in furnishing data in reference to cigarette papers.

ESTIMATION OF CALOMEL.

R. I. GRANTHAM.

The iodometric method for the estimation of calomel is the most expeditious and convenient one. This method, however, cannot be applied generally, especially in the analysis of calomel tablets or similar preparations which contain in addition to the mercury salt various other ingredients. In order to find a reliable method for estimating the calomel in such products the following methods were tried by which reliable results were obtained:—

METHOD I.

0.3 gm. of calomel or an amount of the powdered tablets equivalent to 0.3 gm. of calomel is transferred to a 6 ounce glass stoppered bottle. Any alkali present

[9] J. Am. Chem. Soc. (1911), Vol. 33, 708.

is neutralized with acetic acid and about 5 cc. of chloroform, 20 cc. of N/10 iodine solution and 5 cc. of potassium iodide solution (1:1) are added. The mixture is shaken occasionally for 15 minutes and the excess of iodine is then titrated with N/10 sodium thiosulphate solution. Each cc. of N/10 iodine solution corresponds to 0.0236 gm. or 0.364 grains of calomel.

METHOD II.

0.2 gm. of calomel or a corresponding amount of the powdered tablets is transferred to a 4 ounce Erlenmeyer flask, mixed with 0.5 gm. of potassium chlorate and 15 to 20 cc. of 10 *per cent.* hydrochloric acid. The mixture is digested on a steam-bath for 15 minutes and is then filtered into an 8 ounce glass stoppered bottle. The solution is neutralized with caustic alkali and a sufficient quantity of the alkali is then added to obtain an excess equivalent to about 20 cc. of normal caustic alkali. After the addition of 3 cc. of formaldehyde solution (*37 per cent.*), the mixture is shaken well and is then allowed to stand for 15 minutes. It is then made acid with acetic acid and the metallic mercury which is formed estimated iodometrically as given in Method I. Each cc. of the N/10 iodine solution corresponds to 0.0118 gm. or 0.182 grains of calomel.

METHOD III.

0.3 gm. of calomel or an equivalent amount of the powdered tablets is treated with potassium chlorate and hydrochloric acid as just given. The mixture is filtered into a large beaker, the filter washed well with water and the filtrate is made alkaline with ammonia water. After the addition of a large excess of acetic acid and one to three grams of sodium or potassium oxalate to the filtrate, the mixture is boiled, stirring constantly in order to prevent bumping. After allowing the mixture to settle, it is filtered. The precipitate is washed three times with hot water by decantation, is transferred to a filter and is washed with hot water until free from chlorides, using for this purpose about 150 cc. of water in all. The filtrate and wash-water are then heated to about 80° and the mercury is precipitated with hydrogen sulphide gas and estimated as mercury sulphide in the usual way.

Although Method I, originated by Hempel, is a very expeditious and reliable one it cannot be applied as already pointed out in every case. It is essential that chloroform and acetic acid be used, as I have found that in the absence of chloroform, when tablets are made with mineral oil as a lubricant, the mercury globules are covered with a thin coating of the oil and the iodine solution is thus prevented from acting on the mercury. If such is the case the results naturally will be low. The acetic acid is used in order to dissolve any alkaline salts present.

Method II is devised as a check of Method I, and although it is somewhat more complicated it may be considered as giving more accurate results for general use. Most of the foreign matter present is oxidized by the chlorine liberated from the potassium chlorate by the hydrochloric acid.

In this process the calomel is converted into mercuric chloride, the latter reduced by the formaldehyde to metallic mercury, which in turn is converted by the iodine solution into mercuric iodide. From the amount of iodine solution used for this purpose, found by titrating back the excess of iodine solution, the amount of calomel can easily be estimated.

The third method is well adapted for examining tablets which contain coloring matter, or pills which contain resins, gums and similar substances. The sodium or potassium oxalate is added to eliminate the hypochlorite which is formed during the reaction and which would cause a precipitation of sulphur when conducting the hydrogen sulphide into the solution obtained. Naturally all insoluble matter should be eliminated by filtration before the mercury is precipitated by the hydrogen sulphide. Calcium phosphate which is frequently applied as a diluent in making tablets of this kind is also precipitated as oxalate.

These methods were applied to mixtures of various composition, and also to various kinds of tablets. The mixtures were the following, the amount of ingredients being expressed in grams. The following results were obtained:—

	Mixture No. 1	Mixture No. 2	Mixture No. 3	Mixture No. 4
Calomel	5 gms.	5 gms.	5 gms.	2.5 gms.
Sod. Bicarb.	5 gms.	10 gms.	25 gms.	2.5 gms.
Starch	1 gm.	2 gms.	5 gms.	5 gms.
Talcum	1 gm.	2 gms.	5 gms.	5 gms.
Glycolene	0.5 gm.	1 gm.	2 gms.	2 gms.
Prec. Calc. Phos. q. s. ad	25	50	100	100
Calomel in Mixtures	20%	10%	5%	2.5%

	Mixture No. 5	Mixture No. 6
Calomel	2.5 gms.	2.5 gms.
Milk Sugar q. s. ad	50 gms.	10 gms.
Calomel in Mixtures	5%	25%

	1	2	3	4	5	6
Method I	99.1%	98.0%	100 %	96 %	99.5%	99.1%
Method II	99.8%	100 %	100.9%	96.7%	99.8%	99.2%
Method III	98.3%	99.6%	97.2%	95.1%	100.1%	100 %

Three kinds of tablets were examined and the results obtained by the three methods represent the following amount of the theoretical amount present:—

Tablets				
	Method I	90 %	94 %	106%
	Method II	97.3%	100.1%	98%
	Method III	98.2%	101 %	99%

Analytical Laboratory of Sharp & Dohme, July, 1914.

SOME FACTORS IN DRUG ABSORPTION IN FROGS.

W. F. BAKER, M. S., M. D.

Among the objections that have been urged against the frog-heart assay method for the digitalis bodies, the principal ones are the factor of absorption and the time-limit. Of these, the factor of absorption is undoubtedly the more important, the time-limit being dependent upon the rate of absorption.

The manner in which various fluids are absorbed from the lymph sac or the absorption prevented, has not been determined. Experiments and experience have demonstrated, however, that the majority of healthy frogs will absorb from the ventral lymph sac, in a period of one hour, a quantity of fluid equal to about 0.015 cc. per gram of body weight.

Focke has demonstrated that enough of the digitalis bodies may be absorbed in five to twenty minutes to produce the characteristic digitalis heart and has taken twenty minutes as the time-limit for his method. Magnus, using another method, has extended the time to one-half hour, Famulener and Lyons to one hour, and

Houghton to twelve hours. Not infrequently, when assaying preparations by the one-hour method and by the twenty-four method, I have found that out of a series of ten apparently healthy frogs, in not more than one or two frogs would the absorption be complete. At another time, using the same preparation or solution and frogs of the same lot, and under apparently the same conditions, absorption would be complete in every instance. If this non-absorption was but rarely observed, the cause might be attributed to that ever-ready idiosyncrasy. Occurring as it does at times in nearly every member of a series, it appears to be more than an individual peculiarity, and becomes a factor of great importance in this assay method.

While poor absorption may be met with during any time of the year, it is especially likely to occur during the Spring and late Fall. Certain preparations are very prone to meet with poor absorption, as German digitalin, digitoxin and preparations containing acetic acid or glycerin.

In a series of experiments with strychnine and ouabain, frogs placed in these solutions quickly (3 to 15 minutes) absorbed enough of the drug through the skin to produce the typical poisoning. The same results were secured after pithing (brain only for strychnine—brain and cord for ouabain). In another series, in which the solutions were injected into the lymph sac after pithing, complete absorption had taken place within 60 minutes in some frogs, while with others there had been but little absorption. In another series of experiments, a flap was made from the skin of the abdomen, and the drug painted on the under surface of the flap, that is, the lining of the lymph sac, and in others painted on the surface of the abdominal muscles, care being taken to prevent the solution touching the skin. Typical poisoning was produced in all cases except with ouabain on the inner surface of the flap, when in only two instances was the ouabain action observed in a series of twelve experiments. In still another series after pithing, the skin was removed from the hind legs and the frog suspended so that these were in solutions of strychnine or ouabain. The typical poisonings were produced. This did not occur with strychnine if a ligature was previously placed around the base of the heart.

From these experiments it would appear that absorption, of these two drugs at least, may take place from the outer or inner surface of the skin or from the surface of the muscles. The mechanism of absorption or prevention of absorption is not under control of the central nervous system.

Frogs kept in the light appear to absorb better than those kept in the dark. Absorption occurs more readily at higher temperatures, although at a temperature of 30° C., for one hour absorption is not always complete.

It was suggested that perhaps the manner in which the frogs were kept might have something to do with the absorption. Several series of experiments were made upon lots of frogs of testing them as soon as they arrived and again after they had been kept for some weeks under uniform conditions. The main points brought out by this work were, that different lots of frogs varied in their susceptibility to ouabain and digitalis when first received, and some lots absorbed more readily than others.

To determine if the amount of moisture present in the frog influenced absorption, frogs were kept in dry cases until they had lost 10, 25 and 50 *per cent.* of

their weights and then solutions were injected into the lymph sacs. It was found that these frogs absorbed even less readily than the controls kept in wet cages.

In another series of experiments it was found that .9 *per cent.* salt solution was more readily absorbed than distilled water, and 25 *per cent.* alcohol more readily than the salt solution. 50, 75 and 95 *per cent.* alcohol is fairly well absorbed, but not so readily as the 25 *per cent.*

Frogs which are plainly diseased (red-leg disease) may absorb quite readily, while others which, to all appearances are quite healthy, may not absorb at all. In two instances of this kind, I obtained roughly 25 *per cent.* more fluid from the ventrol lymph sac than I had injected. I believe, however, that the matter of absorption is largely due to the health of the frogs and the condition under which they are kept, and if proper attention is paid to the handling, cleansing and storing of the frogs, but little difficulty will be experienced with poor absorption. If, when assaying, all frogs are discarded which contain an excess of fluid in the lymph sac one hour after being injected, quite uniform and reliable results are obtained by the one-hour frog-heart method.

Department Experimental Medicine, Eli Lilly & Company.

STILLINGIA SYLVATICA.

E. R. MILLER, R. I. BROOKS AND C. P. RUTLEDGE.

The root of *Stillingia sylvatica* has been a popular remedy in the Southern States for more than a century. It was first introduced to the medical profession by Thomas Young Simons, in an article published in 1828, in the American Medical Recorder.

In 1846, Dr. H. B. Frost[1] published a paper on Stillingia in which he considered it "not very far inferior to mercury in its action upon the capillary and secreting vessels in changing their morbid states or conditions."

In 1850, the root of *Stillingia sylvatica* was introduced into the United States Pharmacopœia and has occupied the position of an official remedy ever since.

Concerning the value of the drug there is very great divergence of opinion, but it is still largely used in domestic practice, chiefly as an alterative, and by the medical profession, especially in the form of certain proprietary remedies of which it forms an ingredient. Notwithstanding its long use, however, there is very little known concerning the chemistry of the plant, the pronounced acridity of the drug being attributed to a volatile oil, a fixed oil and a resin called sylvacrol.

The Volatile Oil:—The term "oil of stillingia" has been applied to two products of very different character, meaning on the one hand a preparation obtained from the root by steam-distillation and on the other an alcoholic or ethereal extract of the same. To add to this confusion there are contradictory reports concerning the presence of volatile oil in the root. Thus, W. Saunders[2] extracted five pounds

1. Am. Jour. Pharm., 20, 306.
2. Proc. A. Ph. A., 1868, 460; Am. Jour. Pharm., 41 (1869) 149.

of the dried root with alcohol and obtained five and a quarter ounces of an extremely thick oil. J. H. Harmanson[3] distilled the root with water and obtained an opalescent distillate, but no volatile oil. On the other hand, W. Bichy[4] distilled 100 gm. of the powdered drug and was able to separate from the distillate 3.25 gm. of a yellowish oil lighter than water. This latter result is widely quoted in text-books and works of reference.

With the object of obtaining a quantity of the volatile oil for a chemical investigation, we collected about 150 pounds of the fresh root and after a few weeks subjected it, in a coarsely comminuted condition, to steam distillation. The distillate was acid to litmus and possessed a rather disagreeable odor, but, much to our surprise, only a few drops of a slightly yellowish oil, lighter than water and of disagreeable odor, could be separated from the distillate. A large part of the distillate was neutralized with sodium bicarbonate and shaken out with ether. After removal of the ether only a small residue was obtained. The distillate which had been neutralized and extracted with ether was evaporated on the water bath to a small volume, slightly acidified with sulphuric acid and distilled with steam, but the amount of acid obtained was too small to be examined further. Just what influence the time of collection, method of drying and age of the drug may have on the yield of volatile oil we are unable to say, but we are inclined to doubt the possibility of obtaining ¾% of volatile oil from unadulterated stillingia root under any circumstances.

The Alkaloid:—Bichy's analysis of the root seemed to show, in addition to the ordinary constituents of plants, the presence of an alkaloid (stillingine). E. G. Eberhard[1] made a chemical examination of stillingia root in 1891, and concluded that no alkaloid is present. In his examination the drug was extracted in three different ways, one of which was a repetition of Bichy's process, but in the final test for alkaloids he applied, in two cases, only Mayer's reagent and in the other Mayer's reagent and picric acid. Since Mayer's reagent does not form a precipitate with all known alkaloids, and picric acid may fail to give a precipitate with alkaloids in weak solution, Eberhardt's experiments may be considered as not conclusive.

In order to obtain further knowledge on this question we carried out the following experiments:—

1. 220 gm. of the fresh root, finely comminuted, were extracted by maceration with hot water acidulated with acetic acid. The liquids obtained by straining and expressing were united, filtered and evaporated by gentle heat to a semi-solid mass. This was extracted with alcohol, filtered, the alcohol evaporated off and the residue concentrated to a small volume. This was mixed with 200 cc. of distilled water, filtered, made alkaline with ammonia, extracted with ether and the ethereal solution shaken with a small amount of distilled water acidulated with H_2SO_4. This solution gave characteristic precipitates with the following alkaloidal reagents:—

Wagner's reagent, Dragendorff's reagent, Scheibler's reagent and tannic acid.

3. Am. Jour. Pharm., 54 (1882) 387.
4. *Idem* 57 (1885) 529-531.
(1) Lilly's Bull. No. 17, November, 1891.

2. 150 gm. of fresh root were extracted with hot water acidulated with acetic acid. The total liquid obtained by straining and expressing was concentrated to about 40 cc., made slightly alkaline with KOH and distilled, the distillate being received in a small amount of water acidulated with H_2SO_4. The distillate was evaporated on a water bath to about 5 cc. and then tested with the following results:—

Wagner's reagent gave a reddish yellow ppt.; Dragendorff's reagent gave a yellowish brown ppt.; Scheibler's reagent gave a very abundant white ppt.; Picric acid gave a lustrous yellow crystalline ppt.; Tannic acid gave a yellowish white ppt.; Platinum chloride gave a yellow ppt.

3. 250 gm. of the fresh root were cut into very fine pieces and extracted by maceration with purified 95% alcohol. The alcoholic solution was slightly acidulated with HCl and the alcohol distilled off on a water bath and the residue concentrated by moderate heat to a small volume. This was mixed with 25 cc. of distilled water, filtered, the filtrate made slightly alkaline with KOH and shaken out with ether, the ethereal solution evaporated to small volume and then shaken with 5 cc. of distilled water acidulated with H_2SO_4. This solution gave characteristic precipitates with Wagner's, Dragendorff's, and Scheibler's reagents.

Following the extraction with ether, chloroform was used and an aqueous acid solution prepared in the same way. The above-named reagents gave precipitates with this solution, also, but in smaller amounts.

4. About nine kilos of the fresh root were subjected to pressure, yielding a juice which was free from acridity, but had a slightly sweet taste and a disagreeable nauseating odor. This juice was allowed to evaporate to dryness spontaneously. The residue was extracted with 95% alcohol, filtered, the alcohol evaporated off and the residue reduced to a small volume on a water bath. On the addition of water an oily layer separated. This had a disagreeable odor and was soluble in alcohol, ether and chloroform. The mixture was shaken up with ether, then made alkaline with KOH and again extracted with ether. The two ethereal solutions were concentrated and separately shaken with a small amount of water acidulated with H_2SO_4. With the usual alkaloidal reagents these solutions gave only very slight reactions.

5. About eleven kilos of the fresh root were extracted by the method given in experiment No. 2. From the ethereal solution obtained from this extract, after the addition of two or three drops of HCl, the greater part of the ether was removed by distillation and the remainder allowed to evaporate spontaneously. A brown residue was obtained. This was treated with acidulated water, filtered and tested with alkaloidal reagents. Each of the following gave a decided precipitate:—

Compound solution of iodine, Pot. bismuth iodide, Pot. mercuric iodide, Pot. cadmium iodide, Phospho-tungstic acid, Picric acid, Tannic acid, Phosphomolybdic acid, Mercuric chloride, Platinic chloride.

The remainder of the liquid which gave the above-named tests was made alkaline with NaOH and shaken out with ether. When a drop of concentrated HCl was added to this ethereal solution a yellow precipitate was formed. This was filtered out and found to be soluble in water. The ether solution was allowed to

evaporate spontaneously, the residue mixed with a few cc. of water, filtered, acidulated with HCl and this solution tested with the same reagents. Very heavy precipitates were obtained in all cases.

The total quantity of acidulated aqueous solution was then treated with potassium bismuth iodide. A very heavy deep red precipitate was obtained. This was filtered out, washed with distilled water, mixed with distilled water, acidulated with HCl and H_2S passed through the mixture, the bismuth sulphide filtered off, the filtrate made alkaline with KOH and shaken out with ether and the ether allowed to evaporate spontaneously, leaving a yellow amorphous residue.

Some of this residue, dissolved in water and acidulated gave precipitates with all the reagents named above.

The amount of this residue was not sufficient for further examination.

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CANNABIS SATIVA:

IS THE MEDICINAL VALUE FOUND ONLY IN THE INDIAN GROWN DRUG?

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Not many students of the subject will to-day answer this question in the affirmative. There is too much evidence to the contrary. Some, however, have not yet been brought to the point of accepting as "Standard," an extract of Cannabis Sativa irrespective of the locality from which the crude drug was obtained if the fact is noted that it is not of Indian origin. For this undoubtedly, tradition is largely responsible. Originally only three or four provinces[1] on the west coast of India were included in the territory from which official, medicinally active hemp could be obtained. Later,[2] however, no limit was placed on the drug specifications except that it be from India; and as no distinguishing feature is present to assure its origin as being Indian, no doubt much material appears on the market from other sources and is accepted as "Indian."

This statement might be accepted as the cause for the uncertain action of the drug noted by many observers. What seems much more likely to be the reason for the inconstant and inconsistent results reported by some observers, is that the variable effects, both clinical and pharmacological, which are obtainable even with active material had not, at that time, been sufficiently recognized. Houghton[3].

While the dog is generally accepted as the most satisfactory test animal,[1, 4 & 5] not every one is applicable for the purpose. Many of them must be rejected as not being sufficiently susceptible and even the susceptible ones are not uniformly so.

This being true, unless exceptional care is exercised in observing the pharmacological action of the drug extract, misleading reports are certain to follow.

It is not the intention of the writer at this time, to adduce data to prove the activity of American grown Cannabis Sativa, because it is possible to prove almost anything one wants to prove about the activity or inactivity of extracts of

hemp. The intention is rather to point out the possible reasons for such contradictory reports as have been published. These, on the other hand, are the result of incomplete or inaccurate observation, non-susceptibility of the test animal or patient, use of an extract whose activity had been destroyed or the use of extracts from inert or only slightly active drugs. On the other hand, not infrequently a patient or a test animal is highly susceptible and a particular sample of only average quality is reputed to possess exceptional activity. Many statements regarding the activity of hemp extracts are apparently colored by tradition, it being concluded without further comment that only the Indian grown drug contains the narcotic principle. Cushny[6] states that Cannabis Sativa is of pharmacological interest only when grown in warm climates including Southern United States. Kobert[7] claims that the official preparations have no action on animals and that their action on humans is inconstant. Fraenkel[1] says: "The action of haschish differs greatly according to climate, race and individuality." Bibra's book[8] contains very interesting descriptions of experiments with haschish on humans which proved its strongly differing action on the individual. Sollmann[9] says: "Hemp grown in western countries is generally devoid of Cannabinol and is inactive." Wood, (Geo. B.)[10] noted that the European hemp appeared to have none of the exudate typical of the Indian grown drug and of that growing in the vicinity of Philadelphia. If this last statement is true, it is a logical explanation of European opinion that only the drug from India contains appreciable activity. It is probably true only in exceptional cases. Wood (H. C.)[10] found that less than 1 gr. of an alcoholic extract of Kentucky grown hemp was effective on himself. This would apparently indicate exceptional activity since 1 gram of Ext. Cannabis Indica will not ordinarily produce so intense an action as that described. Actually, it would seem probable that he is occasionally, or generally, more susceptible than the average person.

The most recent reference of note is that by Eckler & Miller[5] in which several series of experiments were carried out, all leading to the conclusion "that if American Cannabis is made official, difficulty will generally be experienced in obtaining highly active lots which will compare favorably with a good Indian drug." One statement in their summary is that "very little dependence can be placed on the estimation of the extractive matter yielded to alcohol." This, in the writer's experience, is too general a statement. The Extract is rarely inactive. When an Extract is entirely soluble in cold 95% ethyl alcohol, the yield is a fair indication of the activity of the drug[11]. There are exceptions to this statement, however, so that it cannot be taken as true in any particular case without being verified by pharmacological assay but it may be taken as roughly indicating the value, other things being equal.

The Powdered Extract Cannabis Sativa, from whatever source the drug originated, very readily deteriorates. In fact, one lot came under the writer's observation in which no activity could be detected, while the extract from which it was made was of full standard activity, i. e., 10 mg. per kilo administered to a susceptible dog elicited the in-coördination characteristic of the drug's action.[11] Undoubtedly, a similar deterioration may take place in the drug or in an extract without any recognizable change in its physical properties.

Exception may also be taken to the experiments of Eckler and Miller on account of the quality of the drug used. In no case was the quality of the crude drug, at all comparable to the quality of the Indian Cannabis with which its activity was compared. A sample of crude drug containing a large proportion of seeds, stems, and leaves, this being the description applying to most of the samples they tested, is very different from the average quality of Indian drug imported, and one should not expect equality either in yield or activity. Much better drug should be and is available on the market.

The writer[11] has carried out tests for the activity of samples of drug grown personally from seed collected from Indian drug, and invariably found no activity in either the stems or seed. The leaves, however, when gathered before any brown color due to decay was evident, were found to contain almost as much extractive with almost the same activity as the imported drug which meets U. S. P. requirements, while the flowering tops of the pistillate plant—the part corresponding exactly to the requirements for Indian Cannabis—were found fully equal and in some cases superior to the average good quality imported drug meeting U. S. P. requirements. This and other equally favorable results were reported in former papers.

There are occasional samples of American drug decidedly less active than standard both as regards yield of extract and its activity. These, however, can be paralleled by samples of Indian drug having no greater activity.

With the exercise of caution in selecting the drug and insistence on certain qualities essential to drug of good quality, American producers can supply material practically of equal value to that imported. It will be necessary, however, for manufacturers of extracts of this drug to recognize the economic difficulties that stand in the way of duplicating the physical qualities of the imported drug. Hand-picking is out of the question and almost of necessity the commercial drug will contain leaves, stems and seeds with some admixture of the male plant.

To obviate the difficulty of so specifying as to exclude undesirable parts, it seems advisable to specify merely as regards yield and activity of extract from the botanically correct drug. Then, no sample of hemp plant that can be economically extracted and that yields an active extract, need be rejected because of physical difference from rigid U. S. P. specifications. If the extract is active and if the yield and the cost of the drug are compensatory we then have an economic condition that should be satisfactory.

Also as Scoville[12] has pointed out, the crude drug is not used as such and really requires no specifications except botanical.

Another question has been raised relative to the comparability of therapeutic and pharmacologic activity. This point was raised by Dr. Rusby and was answered in a paper presented before this section two years ago.[13] Experiments indicated that the dog, under rigidly prescribed conditions, is a satisfactory test animal and that lack of therapeutic results from pharmacologically active samples may safely be ascribed to individual variability. Schroof,[14] moreover, has pointed out that non-susceptibility is not absolute but is merely a question of quantity.

We conclude, therefore, that, first, American hemp contains the active constituent; second, if equal care is exercised in selecting the proper part of the drug for extraction, no material difference in activity will be found between extracts of Indian and American hemp; third, apparent lack of activity and variability in

activity applies equally to both varieties of this drug; fourth, under proper direction there is no valid reason why American hemp cannot be collected to advantage to replace the imported article.

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ESTIMATION OF YELLOW PHOSPHORUS.

H. ENGELHARDT AND O. E. WINTERS.

At the Nashville meeting of the American Pharmaceutical Association we presented a paper on the estimation of Yellow Phosphorus. This paper was offered by us only as a preliminary one. Since then we have made numerous experiments in regard to the estimation of the metalloid and on the strength of these are now compelled in some instances to offer slightly modified methods. Since the paper did not appear in the Journal of the American Pharmaceutical Association up to May, 1914, we requested that the paper be not published prior to the meeting of the Association at Detroit when we would be in a position to give more details of the various methods applied by us in addition to a number of results obtained with pharmaceutic products of various kinds.

For the estimation of phosphorus several methods have been published. The distillation process for estimating phosphorus originated by Mitcherlich and later on modified by Dusart and Blondlot can be applied only when comparatively small quantities of phosphorus are present because the metalloid is not as volatile with steam as is generally accepted. It requires hours to distill as little as 50 mgms. of phosphorus. Neither the oxidation of the phosphorus in the distillate with nitric acid or bromine as carried out in Mitcherlich's method, nor the conversion of the phosphorus into silver phosphide and subsequent oxidation of the latter to phosphoric acid yield satisfactory results.

Various processes depending on the oxidation of phosphorus with nitric acid and simultaneously destroying any organic matter present, by this acid, by concentrated sulphuric acid or other chemicals were therefore recommended by Sayda,[1] Fry,[2] Vanderkleed and Turner,[3] Woerner[4] and others. These processes, however, have the disadvantage in that by them the total and not the elementary phosphorus alone is determined.

Reed[5] determined the phosphorus by allowing a solution of bromine in acetone,

1 Pharm. Zeitschr. f. Russl. XXXVI, 337.
2 Pharm. Post, 1910, 969.
3 Proc. A. Ph. A., 1906, 395.
4 Pharm. Zeit., 1908, 398.
5 Analyst XXIV, 23.

previously standardized against phosphorus, to act on the phosphorus solution, until a faint but persistent yellow color was produced.

Most of the methods for estimating phosphorus depend on the property of phosphorus of forming insoluble phosphides with some of the heavy metals, especially silver and copper, which can easily be oxidized to phosphorous and phosphoric acid respectively.

The methods originated by Tothe,[6] Louise,[7] Stich,[8] Fränkel,[9] and Illes[10] depend on the conversion of a solution of the phosphorus in a convenient solvent (in most cases acetone) into silver phosphide and estimating the latter as such or by oxidation into phosphoric acid.

The property of the copper salts to convert phosphorus into non-poisonous phosphide and finally into phosphoric acid has been known for years, and copper salts therefore have been used with advantage as an antidote in cases of phosphorus poisoning. The first one to use copper salts for estimating phosphorus was Straub[11] whose method was later modified by Katz,[12] who recommends using copper nitrate instead of copper sulphate for converting the phosphorus into phosphide, by Christimanos[13], Korte[14], Tauchert[15] and others. All these investigators found that by the action of copper sulphate on phosphorus, phosphoric acid, sulphuric acid, copper phosphide and metallic copper are formed though they were not able to establish a definite equation for this reaction.

Finally Enell's method must be mentioned. This process which is exceptionally suitable for the estimation of phosphorus in phosphoretted oil depends on the oxidation of phosphorus by standardized iodine solution, titrating back the excess of the latter with thiosulphate solution then estimating alkalimetrically the amount of phosphoric acid formed by the oxidation and deducting from this the amount of acid originally present in the oil.

For estimating the phosphorus in commercial yellow phosphorus and in galenical preparations we have applied both Louise's silver method as modified by Fränkel and Straub's copper method with Katz's modification.

Yellow Phosphorus:—The phosphorus was carefully deprived of any oxidation products by scraping, then dried in an atmosphere of carbonic acid and weighed. It was then dissolved in chloroform free from air and the solution was made up with chloroform to a certain volume.

10 cc. of the solution corresponding to .03656 gm. of phosphorus was mixed in a bottle with 15 cc. of 10 *per cent.* copper nitrate solution from which the air previously had been expelled by heating. The air in the bottle was replaced by carbonic acid gas and the mixture shaken for about one-quarter hour. Hydrogen peroxide was then added and the mixture shaken again until the black color of the copper phosphide had disappeared. The aqueous solution was separated from the

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[6] Chem. Zeit., 1893, 1244.
[7] Compt. rend., 1899, 394.
[8] Chem. Zeit. Rep., 1901.
[9] Pharm. Post, 1901, 117.
[10] Wien. med. Pract., 1901, No. 2.
[11] Archiv der Pharm., 1903, 5, 535.
[12] Apoth. Zeit., 1903, 683.
[13] Zeitschr. anorg. Chem., 1904, 303.
[14] Inaugural Dissertation, Berne, 1906.
[15] Zeitschr. anorg. Chem., 1912, 350.

chloroformic solution, the latter washed out twice with about 15 cc. of water and the combined aqueous solutions and wash-waters after the addition of nitric acid were evaporated to about 5 cc. testing from time to time for unoxidized phosphorous acid. When oxidation was complete the phosphoric acid was estimated in the aqueous liquid as magnesium pyrophosphate. Should any copper salt separate together with the ammonium magnesium phosphate, the latter is re-dissolved and re-precipitated.

In this way we obtained magnesium pyrophosphate corresponding to 101.5 *per cent.* of the phosphorus taken for the estimation. In order to find out whether the phosphorus contained any appreciable amount of oxidation products, the chloroformic solution of the phosphorus was shaken out with various quantities of carbonated water but the amount of magnesium pyrophosphate obtained from the aqueous solution and calculated for phosphorus, showed the phosphorus to have a purity of 99.2 *per cent.* In other words, only traces of oxidation products were present in the phosphorus used for this test.

In another series of experiments 15 cc. of a solution of phosphorus in chloroform containing .1064 gm. of phosphorus were treated in the same way, and the results obtained, calculated for phosphorus, were 100.5, 98.7, 99.8 and 100.0 *per cent.*

When substituting the copper nitrate by silver nitrate and filtering the silver phosphide, we obtained in the first experiments magnesium pyrophosphate corresponding to only 78.6, 77.1, 81.6 and 82.4 *per cent.* of the amount of phosphorus used. This amount was not materially decreased by previously washing the chloroformic solution with water. The results were 78.6, 80.9 and 79 *per cent.* The estimation was carried out by mixing the chloroformic phosphorus solution in a bottle filled with carbonic acid gas with about 10 cc. of a 50 *per cent.* silver nitrate solution, shaking the mixture for about one-half hour, and, after allowing to settle, collecting the silver phosphide in a Gooch crucible. The silver phosphide was then oxidized with 25 *per cent.* nitric acid and in the resulting solution the silver was removed by hydrochloric acid. The mixture was filtered again, the filtrate evaporated to dryness, the residue taken up in water and the phosphoric acid precipitated in the regular way.

The discrepancies in the results obtained by the copper nitrate method and the silver nitrate method were probably due to the fact that on adding to a solution of phosphorus in chloroform, silver nitrate or copper nitrate, some oxidation products of nitrogen are formed in addition to the respective phosphides, which in turn dissolve any metallic phosphide formed or inhibit the formation of the phosphide to some extent.*

In order to prove this, 15 cc. of the chloroformic phosphorus solution, containing .1064 gm. of phosphorus, were treated in an atmosphere of carbonic acid gas with copper nitrate, the mixture was shaken for one-half hour and after settling, the copper phosphide was collected in a Gooch crucible. It was oxidized with hydrogen peroxide solution with the addition of traces of nitric acid, and the solution was evaporated to dryness on a water-bath after the addition of more

* According to Bird and Diggs (Journ. Amer. Chem. Soc., 1914, page 1383), nitric acid is formed when converting the phosphorus into phosphides with copper nitrate or silver nitrate. They also found that nitric acid even when very diluted acts on the phosphorus.

nitric acid in order to convert all the lower oxidation products of phosphorus into phosphoric acid. The residue was then taken up with water and the phosphoric acid estimated in the usual way. By this method we obtained .224, .231 gm. of magnesium pyrophosphate. The filtrate from the copper phosphide was oxidized in the regular way by evaporation in the presence of nitric acid, the residue taken up in water and the phosphoric acid determined as magnesium pyrophosphate; .161, and .153 gm. of magnesium pyrophosphate were obtained. The combined magnesium pyrophosphate obtained from the precipitate and the filtrate therefore was .385 and .384 gm. respectively, corresponding to 100.7 and 100.6 *per cent.* of phosphorus. In another experiment 15 cc. of the phosphorus solution were treated with silver nitrate solution, the silver phosphide was collected in a Gooch crucible, oxidized with nitric acid, etc. The following results were obtained: .307, .303, .305, .308 gm. of magnesium pyrophosphate. In the filtrate .065, .064, .069, .064 gm. of magnesium pyrophosphate was found. This gives a total .372, .371, .374, .372 gm. respectively of magnesium pyrophosphate, corresponding to 97.9, 97.6, 98.1, 97.6 *per cent,* of phosphorus.

These experiments show that the phosphorus cannot be estimated by collecting the copper phosphide or silver phosphide on a filter, because in the reaction some substances are formed which dissolve a part of the phosphide already formed or convert the phosphorus into oxidation products which naturally do not form phosphides.

For the estimation of phosphorus in a solution in chloroform or any other suitable solvent, the copper nitrate method therefore is to be preferred, because the mixture of copper phosphide, copper nitrate, water, chloroform, etc., can be treated directly with hydrogen peroxide solution, while in the silver nitrate method the silver phosphide cannot be well oxidized with nitric acid in the presence of chloroform. In the silver method the silver phosphide is preferably collected in a Gooch crucible and in the filtrate the oxidation products are to be estimated separately thus involving two manipulations instead of one as in the copper method. In our previous paper we expressed the opinion that copper phosphide is more stable than silver phosphide. This, however, is not the case as has developed in the course of later experiments.

Phosphorus Resin:—In our previous paper we reported that for estimating the phosphorus in phosphorus resin we applied the following methods to a sample which was several years old and reputed to have contained originally 10 *per cent* of phosphorus. About 4 gms. of the resin (accurately weighed) were dissolved in 50 cc. of air-free chloroform in a separator, 20 cc. of air-free water were added, the air in the separator replaced by carbonic acid gas and the mixtures shaken for one-quarter hour. An aliquot part of the chloroformic solution was then drawn off and treated with copper nitrate solution as given above. The resin was found to contain 7.33 and 7.45 *per cent* respectively of phosphorus, thus showing that about 25 *per cent* of the latter had been lost either by volatilization or oxidation.

Since then we have made quite a number of experiments in regard to estimating the phosphorus in phosphorus resin, especially for the purpose of finding out whether or not the ammonium magnesium phosphate is free from magnesium

abietate and also to what extent phosphoric acid is formed when treating the copper phosphide with hydrogen peroxide solution only.

The resin used for these experiments was dried over sulphuric acid in an atmosphere of carbonic acid gas for one week. One gramme was dissolved in 50 cc. of air-free chloroform, the solution was shaken out with various small portions of water in order to remove any oxidation products, and was then shaken well for one-half hour with 10 cc. of a 10 *per cent* copper nitrate solution. After the addition of an excess of hydrogen peroxide solution the mixture was shaken again until the copper phosphide had been oxidized, i. e., until the black color of the latter had disappeared. The aqueous solution was then separated in the usual way, mixed with nitric acid and evaporated to dryness. The residue was taken up in water with the addition of hydrochloric acid and the phosphoric acid precipitated with magnesia mixture.

By this process the following results were obtained:—

.224 gm. of $Mg_2P_2O_7$=6.25 *per cent.* of phosphorus
.219 gm. of $Mg_2P_2O_7$=6.13 *per cent.* of phosphorus
.224 gm. of $Mg_2P_2O_7$=6.25 *per cent.* of phosphorus
.225 gm. of $Mg_2P_2O_7$=6.26 *per cent.* of phosphorus

In the next series of experiments the copper phosphide was treated in the same way, the phosphoric acid precipitated with ammonium molybdate solution, the ammonium phospho-molybdate dissolved in ammonia water and the phosphoric acid again precipitated with magnesia mixture. We then obtained:—

0.225 gm. of $Mg_2P_2O_7$=6.26 *per cent.* of phosphorus
0.220 gm. of $Mg_2P_2O_7$=6.15 *per cent.* of phosphorus

In still another series of experiments, the phosphoric acid obtained by oxidizing the copper phosphide and further oxidizing the resulting solution with nitric acid was precipitated with magnesia mixture, the ammonium magnesium phosphate was dissolved in hydrochloric acid, and this solution was shaken out with ether to remove any abietic acid. The phosphoric acid was then precipitated with magnesia mixture. This yielded:—

.227 gm. of $Mg_2P_2O_7$=6.34 *per cent.* of phosphorus
.224 gm. of $Mg_2P_2O_7$=6.25 *per cent.* of phosphorus

These results clearly show that in precipitating the aqueous solution with magnesia mixture no magnesium abietate is carried down with the ammonium magnesium phosphate.

That by oxidizing the copper phosphide with hydrogen peroxide solution alone, only a part of the phosphorus is oxidized to phosphoric acid is shown by the following experiment:—

One gramme of the above resin was treated as given before and the aqueous solution obtained after decomposing the copper phosphide with hydrogen peroxide solution was precipitated with magnesia mixture.

.140 gm. of $Mg_2P_2O_7$=3.92 *per cent.* of phosphorus
.140 gm. of $Mg_2P_2O_7$=3.92 *per cent.* of phosphorus
.143 gm. of $Mg_2P_2O_7$=4.05 *per cent.* of phosphorus

were obtained, thus showing that only 50 *per cent.* of the copper phosphide had been oxidized to phosphoric acid. It is, therefore, absolutely necessary to oxidize the aqueous liquid containing the oxidation products of the phosphorus with a strong oxidizing agent, preferably nitric acid.

When applying the silver method to the resin only

.153 gm. of $Mg_2P_2O_7$=4.27 *per cent.* of yellow phosphorus
.153 gm. of $Mg_2P_2O_7$=4.27 *per cent.* of yellow phosphorus
.148 gm. of $Mg_2P_2O_7$=4.14 *per cent.* of yellow phosphorus

were obtained, or only about 65 *per cent.* of the amount obtained by the copper method. With another old resin the following figures were obtained:—

Copper method	Silver method
5.57 *per cent.*	3.88 *per cent.*
5.85 *per cent.*	3.82 *per cent.*
5.85 *per cent.*	4.02 *per cent.*

thus again showing that by the silver method only about two-thirds of the phosphorus as found by the copper method is obtained.

For estimating the oxidation products present in the resin, the following experiments were made with a preparation containing

7.33 *per cent.* of phosphorus; 7.45 *per cent.* of phosphorus

when assayed by the copper nitrate method.

4 gms. of resin were dissolved in 50 cc. of air-free chloroform and the solution was shaken out in a separator filled with carbonic acid gas with several portions of air-free water. The chloroformic solution was transferred to a 100 cc. graduated flask and the volume of the liquid was made up with air-free chloroform to the mark. In aliquot parts of the chloroformic solution the phosphorus was determined by the copper nitrate method directly, without separating the copper phosphide. The aqueous solution after expelling any dissolved carbonic acid by heating was titrated with N/10 caustic potash solution of which 51.3 cc. 50.4 cc. were required for neutralization, using phenolphthalein as indicator. This amount corresponds to 12.8 and 12.6 cc. respectively for one gramme of resin. In another series of experiments only 2 gms. of resin were used for the estimation, when 26.6 and 26.0 cc. of N/10 KOH were used, corresponding to 13.3 and 13.0 cc. for one gramme of resin. Since the alkali is used for the various oxidation products of the phosphorus, it was impossible to calculate the amount of phosphorus present as oxidation products from the amount of alkali used in the titration. The aqueous liquids were therefore evaporated after the addition of nitric acid and in the residue the phosphoric acid was estimated as magnesium pyrophosphate. Thus the following results were obtained:–

Experiment I. (4 grams.)
.281 gm. of $Mg_2P_2O_7$
.288 gm. of $Mg_2P_2O_7$
corresponding to .07024 gm. of $Mg_2P_2O_7$
.072 gm. of $Mg_2P_2O_7$ in one gm. of resin or to
1.96 *per cent.* of phosphorus
2.03 *per cent.* of phosphorus

Experiment II. (2 grams.)
.146 gm. of $Mg_2P_2O_7$
.149 gm. of $Mg_2P_2O_7$
corresponding to .073 gm. of $Mg_2P_2O_7$
.0745 gm. of $Mg_2P_2O_7$ or to
2.04 *per cent.* of phosphorus
2.065 *per cent.* of phosphorus

These experiments show that the direct copper method can be used for estimating the percentage of elementary phosphorus in phosphorus resin. They also show that it is quite easy to estimate the amount of oxidation products of phosphorus present in the preparation.

Phosphorus Paste:—For phosphorus paste such as is used for making pills the following method was applied. About one gramme of the paste, exactly weighed, was mixed in a bottle filled with carbonic acid gas, with 25 cc. of air-free chloroform and 25 cc. of air-free water and the mixture shaken for fifteen minutes. After allowing the mixture to separate, the aqueous layer was siphoned off, and the chloroform was shaken once more with 15 cc. of air-free water to remove the last traces of oxidation products of phosphorus. The water was again separated from the chloroformic solution and the latter was treated with copper nitrate and silver nitrate respectively and the estimation carried out as outlined above.

In a paste supposed to contain 7 *per cent.* of phosphorus, 6.86 and 6.7 *per cent.* were found by the copper method. By the silver method, only 5.78 and 5.86 *per cent.* of phosphorus were found. The above method applied for the estimation of phosphorus in another paste supposed to contain 10 *per cent.* of phosphorus was modified in that the aqueous solution after separating was shaken out with two portions of 25 cc. each of chloroform in order to remove any phosphorus suspended in the liquid. The combined chloroformic liquids were then treated in the regular way with copper nitrate solution. Thus 9.29 and 9.64 *per cent.* of phosphorus were obtained, by the silver method only 7.19 and 7.24 *per cent.*

Spirit of Phosphorus:—The N. F. directs that spirit of phosphorus be made by boiling 1.2 gms. of phosphorus with 1000 cc. of absolute alcohol until solution has taken place, and after cooling replacing any alcohol lost by evaporation. No requirements are given for the finished spirit, and it is probably understood that the spirit contain about 0.1 *per cent.* of phosphorus. In our previous paper we reported that we had been unable to prepare a spirit containing even approximately the amount of phosphorus required and we ascribed this shortage to oxidation of the phosphorus taking place during the boiling.

The method which we applied at that time was the following:—25 cc. of the spirit were transferred to a separator, mixed with air-free copper nitrate solution and the air in the separator replaced by carbonic acid gas. The mixture was then shaken well for a short time and allowed to stand until complete separation of the copper phosphide had taken place. The latter was collected on a filter in an atmosphere of carbonic acid gas, washed with a little air-free copper nitrate solution, decomposed by hydrogen peroxide solution preferably with the addition of a few drops of nitric acid, the solution evaporated in the presence of nitric acid to about 5 cc. and the phosphoric acid estimated as magnesium pyrophosphate. In the filtrate from the copper phosphide the oxidation products present in the spirit were estimated in the regular way. We thus obtained the following results with a spirit which was prepared by boiling phosphorus in excess with absolute alcohol for 12 hours and preserving the spirit in a bottle filled with carbonic acid gas.

Phosphorus converted into copper phosphide.	*Phosphorus present as oxidation products in filtrate from copper phosphide.*
0.068 *per cent.*	0.123 *per cent.*
0.073 *per cent.*	0.116 *per cent.*
0.0678 *per cent.*	
0.0704 *per cent.*	
0.069 *per cent.*	
0.0708 *per cent.*	

At that time we made a number of experiments by precipitating the phosphorus from the spirit in the presence of varying amounts of alcohol and water, and since

we found that the strength of the alcohol did not have any material influence on the yield of copper phosphide we concluded that the phosphorus was precipitated quantitatively as phosphide. However, we did not take into consideration the amount of phosphorus not converted into phosphide, nor the amount of phosphide redissolved by the oxidation products of nitrogen which are formed in the reaction.

Since then (see results below) we have found that in making spirit of phosphorus only about 10 *per cent.* of the phosphorus is converted into oxidation products during the boiling process. The above spirit therefore contained

0.172 *per cent.* 0.170 *per cent.*

of phosphorus instead of about 0.07 *per cent.* as reported at that time.

After numerous experiments we finally found the following method to be quite reliable for estimating the yellow phosphorus in the spirit:—

25 cc. of the spirit (prepared by boiling an excess of phosphorus with ordinary alcohol) was mixed with 50 cc. of air-free chloroform and 50 cc. of water. The mixture was shaken well and when complete separation had taken place the chloroformic solution was drawn into a flask filled with carbonic acid gas. The aqueous liquid was shaken out with two more portions of 25 cc. each of chloroform in order to remove any phosphorus suspended in the aqueous solution and the combined chloroformic liquids were then treated with copper nitrate in the usual way. The copper phosphide mixture was oxidized with H_2O_2 and the phosphoric acid estimated in the usual way. In the aqueous liquid obtained by shaking out the diluted spirit with water, the oxidation products of phosphorus were estimated. We thus obtained the following results:—

Phosphorus as such in the Spirit	Oxidation Products.
.133 gm. $Mg_2P_2O_7$=.149 *per cent.*	0.0123 *per cent.*
.137 gm. $Mg_2P_2O_7$=.153 *per cent.*	0.0121 *per cent.*

In another series of experiments the spirit diluted with water was shaken out with chloroform, the chloroformic solution was treated with copper nitrate, the copper phosphide separated by filtration in an atmosphere of carbonic acid gas and the phosphorus estimated both in the precipitate and filtrate. We obtained

Phosphorus from precipitate.	Phosphorus from filtrate.
0.071 gm. $Mg_2P_2O_7$=0.0795 *per cent.*	0.062 gm. $Mg_2P_2O_7$ 0.0693 *per cent.*
0.071 gm. $Mg_2P_2O_7$=0.0795 *per cent.*	0.066 gm. $Mg_2P_2O_7$ 0.0715 *per cent.*

Replacing copper nitrate by silver nitrate, filtering the silver phosphide, etc., we obtained:—

Phosphorus from precipitate.	Phosphorus from filtrate.
.102 gm. $Mg_2P_2O_7$=.114 *per cent.*	0.026 gms. $Mg_2P_2O_7$ 0.0297 *per cent.*
.100 gm. $Mg_2P_2O_7$=.116 *per cent.*	0.026 gms. $Mg_2P_2O_7$ 0.0291 *per cent.*

These results clearly show that copper phosphide is more soluble than silver phosphide in the oxidation products of nitrogen formed by the action of copper nitrate on a chloroformic solution of phosphorus in the presence of alcohol.

We have made a series of experiments with the purpose in view to reduce the amount of soluble phosphorus compounds by filtering the silver phosphide in an atmosphere of carbonic acid gas, but this seems to have no influence whatever on the results. In our previous paper we pointed out that the spirit of phosphorus is a rather unstable preparation even when kept in an atmosphere of carbonic acid, and this statement has been verified by recent experiments.

A spirit assaying at the time of manufacture .137 *per cent.* assayed, after one week's standing, only 0.117 *per cent.* and the oxidation products, calculated as phosphorus, had increased from 0.0123 *per cent.* to 0.0313 *per cent.* After three week's standing the percentage of phosphorus had been decreased to 0.088 *per cent.* A spirit prepared under exactly the same conditions, which, however, was not assayed at the time of manufacture, showed after four months standing only 0.0415 *per cent.* of yellow phosphorus and 0.087 *per cent.* of phosphorus present as oxidation products.

Only freshly prepared spirit of phosphorus should therefore be used.

Phosphorus Pills:—The process applied for assaying phosphorus pills and tablets both of plain and complex composition, is almost identical with that given for the assay of phosphorus paste.

A quantity of pills equivalent to about one grain of phosphorus is mixed in a bottle with 25 cc. of air-free water and 100 cc. of air-free chloroform. The air in the bottle is replaced by carbonic acid gas and the mixture is then shaken well until the pills are disintegrated. After allowing the liquids to separate as much as possible the aqueous layer is siphoned off. The mixture is then shaken with sufficient tragacanth to eliminate the remaining water, an aliquot part of the chloroformic solution is filtered off, treated with copper nitrate, etc.

We have examined a great number of pills and tablets and the following results may therefore be of interest:—

Phosphorus Pills plain 1/100 *gr.*
1/92, 1/92.7, 1/92, 1/93, 1/90 gr.

Phosphorus Pills plain 1/50 *gr.*
1/48, 1/45, 1/46.5 1/46.2 gr.

Phosphorus Pills plain 1/25 gr., 1/23.4, 1/24.2, 1/25.

Pills claimed to contain 1/30 gr. of phosphorus in addition to extract of damiana and extract of nux vomica, were found to contain 1/30 gr. and 1/31 gr. of phosphorus respectively.

Four lots of Aphrodisiac pills which contained, in addition to 1/100 gr. of phosphorus, extract of damiana and extract of nux vomica assayed 1/102 gr., 1/112, 1/98, 1/101 gr.

Another kind of Aphrodisiac pills which contained, in addition to the above ingredients, powdered muirapuama were found to contain 1/93 and 1/94 gr. of phosphorus instead of 1/100 gr. claimed on the label.

Pills coated with sugar, showed that no loss of phosphorus is entailed in the coating process as shown by the assay of four lots of Aphrodisiac pills which assayed, instead of 1/100 gr. of phosphorus, 1/102, 1/98, 1/101 and 1/102 gr.

All these assays were carried out with the copper method without filtering the copper phosphide. These results were obtained with freshly-made pills. In the manufacture of these pills an excess of 10 *per cent.* of phosphorus had been added to the pill mass in order to meet any loss of phosphorus by volatilization and oxidation.

That, however, phosphorus pills are not absolutely stable may be shown by the following results:—Plain phosphorus pills which were one year old showed only 86.2 *per cent.* of the amount of phosphorus claimed on the label; pills containing 1/50 gr. after one and one-half years showed only 83.5 *per cent.;* one year old 1/100 gr. pills assayed 76 *per cent.;* nine months old 1/150 gr. pills only 79 *per*

cent. These results seem to show that the greater the dilution of the phosphorus in the pill mass the greater the loss of phosphorus.

While the loss of the metalloid is not very great in plain pills it is quite marked in complex pills. Aphrodisiac pills which were one year old and which contained 1/100 gr. of phosphorus, in addition to extract of nux vomica and extract of damiana, contained after one year only 42 *per cent.* of the phosphorus present.

In a lot of Aphrodisiac pills one year old, which contained nux vomica and damiana with 1/100 gr. of phosphorus, only 57 *per cent.* of the phosphorus was found.

A lot of the same kind of pills 11 years old showed only 16 *per cent.* of the phosphorus as claimed on the label.

Pills containing in addition to 1/100 gr. of phosphorus, ¼ gr. of extract of nux vomica, showed after three years 46.5 *per cent.* Pills containing in addition to 1/50 gr. phosphorus, ¼ gr. of extract of nux vomica, showed after one and one-half years 42.5 *per cent.* of phosphorus, while other pills which contained in addition to 1/50 gr. of phosphorus, ⅛ gr. of extract of nux vomica, after the expiration of three years still showed 75 *per cent.* of phosphorus.

Pills containing 1/50 gr. of phosphorus in addition to 1 gr. powdered cantharides and 1 gr. of powdered nux vomica, showed after two years 68.5 *per cent.* of the amount of phosphorus originally present.

Phosphorus, Quinine and Nux Vomica pills containing 1/50 gr. phosphorus, 1 gr. quinine sulphate and ¼ gr. extract of nux vomica contained after one year 45 *per cent.* of phosphorus. On the other hand pills containing 1/40 gr. phosphorus, 1 gr. zinc sulphate, 2 grs. extract valerian, still showed after three years 91 *per cent.* of the phosphorus originally present.

That the presence of extracts has a greater influence on the dissipation of the phosphorus than plain ingredients such as alkaloids, etc., may be shown by the following results. Phosphorus and Strychnine pills supposed to contain 1/50 gr. phosphorus and 1/60 gr. strychnine showed after one year 89.5 *per cent.* of phosphorus; pills containing 1/100 gr. of phosphorus and 1/60 gr. of strychnine still showed after three-quarters of a year, 93 *per cent.* of the amount of phosphorus. Phosphorus, Quinine and Strychnine pills containing 1/50 gr. of phosphorus, 1 gr quinine sulphate, 1/60 gr. strychnine, after two years still contained 85 *per cent.* of phosphorus.

As has been pointed out in our previous paper, the presence of iron salts seem to favor the dissipation of the phosphorus, because in four lots of pills containing varying amounts of iron in the form of iron carbonate or reduced iron, phosphorus was found only in very small amounts. We have again made quite a number of experiments with Aphrodisiac pills containing in addition to the other ingredients, phosphorus and iron bromide. We have tried the copper nitrate, silver nitrate and copper acetate methods, but in no case have we been able to obtain trustworthy results. The phosphorus seems to act on the iron bromide and thus make the assay extremely difficult, if not impossible.

Of tablets we examined only a few lots containing extract of damiana and extract of nux vomica in addition to 1/30 gr. of phosphorus. In freshly made tablets we found 1/29, 1/31, 1/28, 1/33 gr. of phosphorus. On reassaying the tablets after 1, 2, 4 and 6 months we found the amount of phosphorus originally

present in the tablets had decreased considerably. This seems to show that the phosphorus keeps better in pill mass than in tablet mass and also better in coated than in uncoated pills.

Elixir of Phosphorus:—In our previous paper we reported that we had applied the following process for estimating yellow phosphorus in elixirs of phosphorus, especially in those which are largely used as aphrodisiacs, such as Elixir Phosphorus, Nux Vomica and Damiana.

25 cc. of the elixir under examination are mixed with 100 cc. of air-free chloroform in a 150 cc. bottle, the air in the bottle is replaced by carbonic acid gas and the mixture is shaken well for one-quarter hour. An aliquot part of the chloroformic solution (taking into consideration the amount of alcohol present in the preparation) is then separated, shaken with copper nitrate and the assay is then finished in the usual way. We reported at that time that elixirs of this kind made with freshly-prepared spirit of phosphorus do not retain the phosphorus for any length of time. This could be proven not only by assaying the elixir according to the copper method, but also by applying Mitcherlich's test.

Quite recently we have modified the method in the following way:—25 cc. of the elixir is mixed with 50 cc. of air-free water in a separator, the air in the separator is replaced by carbonic acid gas and the mixture is shaken out with 50, 25 and 25 cc. of air-free chloroform. By this process the alcohol present in the elixir does not need to be taken into consideration. The combined chloroformic liquids were then shaken out once with 10 cc. of air-free water in order to remove any oxidation products of the phosphorus suspended in the chloroformic solution, and the latter was then treated with copper nitrate in the regular way. An elixir which contained in addition to the other ingredients 24.40 *per cent.* of spirit of phosphorus, yielded when assayed by the copper method only 0.0198 *per cent.* of phosphorus. The spirit used for making this elixir assayed .09 *per cent.* of elementary phosphorus. After three weeks standing in an ice-chest the percentage of phosphorus had been reduced to 0.0179 *per cent.*, thus showing a loss of about 10 *per cent.* It is rather difficult to estimate the amount of phosphorus in the regular Elixir Phosphorus, Nux Vomica and Damiana which contains only about 6 *per cent.* of spirit of phosphorus. We have made a great number of experiments with various lots of this elixir, but the results obtained, although agreeing very well when made with the same lot of elixir, varied considerably from those obtained with other lots of the elixir. This is probably due to the presence of traces of phosphates in the various ingredients used for manufacturing the elixir, which, considering the small amount of phosphorus present in the preparation, are liable to upset the results considerably.

Having found that a reliable method is available for estimating phosphorus in most pharmaceutical preparations, we expect to determine the rate of deterioration of such products. We shall also apply other copper salts, copper sulphate, acetate, chloride, etc., for converting the phosphorus into phosphide, and we hope to be able to report on these experiments at the next meeting of the Association.

Analytical Laboratory of Sharp & Dohme, Baltimore, Md., July, 1914.

Section on Education and Legislation

Papers Presented at the Sixty-Second Annual Convention

PHARMACEUTICAL EDUCATION.

FRANK R. ELDRED.

Pharmaceutical Education is a very comprehensive title, and it will, perhaps, be well at the outset to state that the present discussion refers only to the training in the United States for certain branches of pharmaceutical work.

The consideration of pharmaceutical education is usually limited to the educational requirements of retail pharmacy, but it must be remembered that the requirements of modern pharmaceutical manufacturing and drug inspection are quite different. Students frequently seek advice in regard to the course of study which should be pursued to fit them for positions as drug chemists; and directors of schools of pharmacy, chemistry, and chemical engineering occasionally ask the same question. The answer is usually unsatisfactory, for this branch of pharmaceutical education has received very little attention. Teachers have frequently had experience as retail pharmacists, but rarely as manufacturers or drug inspectors, therefore, they cannot know the requirements for such positions from personal experience, and it remains for official and industrial drug chemists to indicate the character of training required. The writer believes that this should be essentially the same for chemists who engage in drug inspection and manufacturing, and it is hoped that this discussion will lead to the consideration of this field by those engaged in educational work.

The first thing to establish, is the demand for such specially-trained men, but this seems evident since the federal government and all the states require drug chemists, and every pharmaceutical manufacturer requires from one to fifteen or twenty such chemists. The conditions which exist in different manufacturing establishments vary widely; in the small factory all of the scientific work may devolve upon one man and in such cases he must have a broad and varied pharmaceutical training if he is to succeed, however such positions offer the greatest opportunities for general experience. In the large establishments where many scientific workers are employed, a high degree of specialization exists, some have no knowledge of pharmacy, others a knowledge of only one branch of the industry; nor is a pharmaceutical training necessary to all, for a botanist in the employ of such an establishment should be essentially a botanist with particular knowledge of the vegetable drugs and not a pharmacist with some additional training in botany. The chemist or pharmacist, however, should have general pharmaceutical training and it is to the education of this class that the present discussion refers.

The demand being established it may be asked if there is not a sufficient supply of such chemists. The existing condition is that practically no students have received or are receiving the kind of training desirable in such positions and graduate chemists with no pharmaceutical knowledge are usually employed, the alternative being to employ men who have obtained such knowledge at the expense of their general chemical training. A man with good chemical training can by years of experience obtain the necessary pharmaceutical knowledge, but it is much more difficult for the graduate pharmacist to acquire a sufficient knowledge of chemistry in this way. In a small establishment, however, where only one chemist is employed, he must have at the beginning, the pharmaceutical as well as chemical training. In the larger establishment the young chemist will probably be started on analytical work which does not require pharmaceutical training, although familiarity with the pharmacopœia and with medicinal products would be of great advantage.

Teachers of engineering and of industrial chemistry, wish to keep their students out of the drafting room or analytical laboratory, unless these may be expected to act as stepping-stones to executive positions or to actual engineering practice. In the factory where medicinal products are manufactured a certain amount of research work is necessary and many chemical engineering problems are solved; this work should be done by men promoted from the analytical laboratory, provided they have the essential pharmaceutical knowledge acquired either by training or experience, otherwise such positions must be filled by bringing in specially-qualified men if they can be found. Unless he has had a preliminary pharmaceutical training only the exceptionally energetic and studious chemist engaged upon some particular line of analytical work, can fit himself for such positions.

If it be granted that there is an active demand for drug chemists which is not supplied by the existing system of pharmaceutical education, the next step will be to determine the length and character of a course calculated to train men for such positions. This is a difficult subject and one which must receive the attention of many men engaged in educational and industrial work before satisfactory courses can be outlined. The writer will therefore only treat the matter in a general way and touch upon some details which are matters of personal observation.

All of the other branches of pharmaceutical work depend upon retail pharmacy for their existence, therefore it is highly desirable, if not absolutely necessary, for one who expects to advance very far in any line of pharmaceutical work, to have some information in regard to the retail drug business upon which to build his general knowledge of pharmaceutical matters. Actual experience in a drug store, is the best way to acquire such information, although if this is impossible, judicious reading and observation will go far toward supplying it.

There are many excellent chemistry courses in which the time given to the study of language, mathematics, physics, and general, theoretical and analytical chemistry, is properly proportioned, and the prospective drug chemist should receive just such training; in addition a thorough drill in assaying drugs should never be overlooked. The subjects provided for in the Pharmaceutical Syllabus should be included except where these are covered by the regular chemistry course. Some engineering knowledge is also essential to the manufacturing pharmacist, although it may not be necessary in drug inspection. It may be objected that the

proposed course of study would require six or seven years, but time could be saved in working out the details of such a course and it could undoubtedly be handled in a very satisfactory manner in five years. Would it pay students to take such a course? This can be answered in the affirmative, as most of the men now entering this field have had four years of college work and the additional year would enable them to command a higher salary from the beginning and would enhance their prospects of promotion to positions of greater responsibility.

At the present time graduate-chemists, available for positions in drug laboratories, are frequently deficient not only in pharmaceutical training, but also in their knowledge of physical and physiological chemistry, and it is exceptional to find men who have been trained to make proper use of the chemical literature. There is usually a lack of knowledge concerning the use and care of electrical and optical instruments, balances and weights, and other laboratory equipment, which results in inaccurate work and often in ruined instruments. There has been no engineering or mechanical training and, therefore, a simple mechanical drawing cannot be executed and neither special laboratory apparatus nor factory equipment can be designed. All of these things should be especially emphasized in a course in pharmaceutical chemistry and as the time devoted to such a course will be so fully occupied, extraneous subjects must be omitted. There will be no time for food analysis, mineralogy, metallurgy and other subjects not related to the chemistry of medicinal products, and their places should be taken by drug analysis and by the chemistry of industrial processes more closely related to pharmacy.

Mention must be made of the courses which have already been established for the purpose of training drug chemists. All of these courses must be classed as failures in some degree on account of a lack of coöperation between the industrial and official drug chemists and those engaged in educational work. Four-year pharmacy courses are, as a rule, only a little better than the shorter courses, in fitting men for practical drug work; instead of giving more thorough training in chemistry, the extra time is usually occupied with cultural and miscellaneous scientific subjects in a way which makes it appear that it is somewhat difficult to fill two additional years, when, as a matter of fact, a period of four years is too short a time even if every non-essential, though probably desirable, subject is omitted. A still more illogical course is the three-year course, where the regular two-year pharmacy course is supplemented by a third year of food and drug analysis. To attempt to combine food and drug work in a three-year course is absurd and can only lead to the encouragement and perpetuation of certain abuses which now exist. It would be much better if schools of pharmacy would use their influence to separate food and drug work, rather than to associate them more closely. Since it is unfortunately true that foods and drugs are linked together in the laws, it is particularly desirable that administrative officers should be able to secure the services of chemists who are thoroughly trained in pharmaceutical chemistry to carry on the work of the drug laboratory. The "cramming" of a lot of analytical methods, can result only in their empirical use, and this is one of the conditions which are now handicapping drug manufacturing and inspection. Let the chemical training be so broad and thorough that the principles upon which methods are based can be clearly understood; the limitations of the methods will then be recognized and

they will be used with judgment and modified when necessary to suit varying conditions.

It may be objected that very few men at present connected with drug work, have had the training which has been advocated, yet many succeeded, but it must be recognized that their success would have been earlier and ultimately greater if they had started with the thorough training which has been suggested. We have worked as well as we could with the material at hand, but if thoroughly trained pharmaceutical chemists had been available during the past eight or ten years, this branch of chemistry would be much further advanced and would be recognized by chemists in other lines of work; nor would it be possible for a well-informed chemical engineer to say to the writer, as was done a short time since, "Pharmaceutical work at present is entirely empirical, is it not?"

Scientific Division, Eli Lilly & Company, Indianapolis.

PHARMACEUTICAL EDUCATION, OR THE EDUCATION OF THE PHARMACIST; WHICH SHALL IT BE?

JACOB DINER.

The question of education is justly occupying the minds of many men, educators and laity, and not the least interested in this question are those men who are chiefly concerned with professional education. The medical press for the last ten years has devoted a great deal of time and considerable space to the subject of medical education and the pioneer of American medical journals, the Journal of the A. M. A., regularly brings a column or more on medical education and legislation.

In one of his usual masterly addresses, Henry P. Hynson some time ago sounded the key-note when he spoke of the pharmacist and his need of general education.

Therefore, in taking up the subject of Education as related to Pharmacy and the Pharmacist, we must closely differentiate between the education of the pharmacist and pharmaceutical education.

Modern pharmacy (or, should I say the modern pharmacist?) consists essentially of two integral parts. On one side we must have the professionally or rather specifically-trained man, on the other side we must prepare the same man to be commercially able to avail himself of every honest and legitimate means for the financial advancement of his business. How far shall we educate the embryo pharmacist for one and prepare him for the other,—does modern pharmacy really demand a professionally-trained pharmacist? Is the commercial training compatible with scientific education? To all of which I reply:—Most emphatically yes. The times have passed when the first essential to scientific attainments was utter lack of practical knowledge and disregard of the so-called worldly petty details such as dress, manners, sociability, etc.

The bespectacled professor who forgot his umbrella, his clothes, his meals, his wife, his family, his friends, etc., in short everything that was not ultra scientific still brings forth a sympathetic smile when we see him depicted in our so-called "funny" papers, but modern life and modern scientific progress has no place for him. Just so is the grouchy, misanthropic, sloppy, *yes, sloppy,* old, not to say antiquated, pharmacist in the dimly lit and indifferently- kept apothecary shop, out of place. Thus we must take our young men and teach them pharmacy consisting of the regular, more or less classic, curriculum and at the same time inculcate them with modern business methods so that they may advantageously market their professional attainments.

The New Syllabus of Pharmaceutical Education recently issued by the Committee and adopted by the New York State Board of Pharmacy assigns a number of hours for the subject of commercial pharmacy. No better step for the advancement of pharmacy and pharmacist could have been taken. The pity of it is that these hours are taken from the important subject of pharmacy (practical and manufacturing). Far better had they been taken from the relatively less important subject of Pharmacognosy. I do not want to be understood as holding the subject of Pharmacognosy as superfluous or non-essential. But we must admit that, outside of the specialist in this branch, it is of considerable less importance to the practical and practising pharmacist than are the subjects of Manufacturing, Prescription-Compounding and Merchandising, so long as the regulation Pharmacy course can only take up 1200 hours in two calendar years with a preliminary education of one year high-school or "its equivalent." Would I then want an increased curriculum with higher preliminary education? Yes, and no! For purely pharmaceutical training to meet the demands of the every-day variety of Pharmacy I would most emphatically oppose any attempt at increasing the requirements, either preliminary or professional. I would modify, I would alter, but I would not increase. I would change the foolish attempt to make an organic chemist, a trained pharmacognocist, a physiologist and a Latin scholar, out of a young man who has obtained 15 regents points by an examination in Russian, Italian, Spanish, or whatever his native tongue may be, and who does not know how to handle the simplest mathematical problem. For pharmaceutical education the New Syllabus is more than sufficient.

For the man who wants to specialize, who desires to go beyond the prescription and sales-counter increased training is demanded, and this is provided for in the Syllabus by higher preliminary requirements, more specific training and corresponding higher degrees.

When we come to the education of the pharmacist, that is a different matter altogether.

Let us for once refuse to imitate the ostrich. Let us look the situation in the face, calmly and honestly. Of what material is the great bulk of pharmacists composed? Are they really professional men, and if so, are they really educated men? For after all the collection of a certain amount of special knowledge does not constitute education. How many pharmacists are even approximately posted on the most important topics of the day, even including the European war and baseball? How many pharmacists get out of their four walls to see the world

and be seen by it? How many are interested in scientific and mechanical progress or even the progress made in our own branch? Out of 40,000 pharmacists or over, how many are members of the A. Ph. A., of the N. A. R. D., of their own State Pharmaceutical Association? At a paper read recently at the New York State Pharmaceutical Association the figures given for attendance at State Pharmaceutical Associations throughout the entire United States, showed, if my memory serves me right, an attendance of less than 10%. What Pharmacy needs for its rank and file is not increased Pharmaceutical Education, but increased Education of the Pharmacist!

THE COMPOSITION OF BLOOD.

When Mephistopheles insists that the bond he makes with Faust be signed with blood, and remarks, "Blut ist ein ganz besondrer Saft" (Blood is an extremely peculiar juice), even Goethe, great scientist as he was, had no conception of how wonderful a fluid it is. Human blood consists of a transparent yellowish liquid called the plasma, in which float red corpuscles and at least five kinds of white corpuscles, usually called leucocytes. When the health is normal, each cubic millimeter of the blood contains about 5 million red corpuscles and 7500 leucocytes. The enormous numbers of these corpuscles, red and white, may be faintly realized when it is stated that a cubic inch is equal to nearly 16 thousand cubic millimeters. These cells are greatly changed both in number and condition by ill health. Some of the white corpuscles are called phagocytes (cells that eat) because when the blood is invaded by disease-causing (pathogenic) parasites, it is the business of the phagocytes to run them down and make a meal of them. So wonderful is the behavior of the phagocytes that one eminent scientist recently said of them, "The mononuclear and polynuclear leucocytes have qualities which it is very difficult to call anything else but consciousness." That is to say, each cell is endowed with a mind that directs its marvelous activities. But more wonderful than the corpuscles that it contains is the plasma itself. It can be so changed or modified by zymotic diseases or by certain serums or vaccines that the patient will be immune for years or even for life against a second attack from the same disease, but he will be safe from no other disease of the infectious kind unless he has been vaccinated for it with the proper serum. Blood is indeed an "extremely peculiar juice." How peculiar, who shall say?—*Ambition.*

Section on Historical Pharmacy

Papers Presented at the Sixty-Second Annual Convention

FORTY-FIVE YEARS OF MANUFACTURING PHARMACY.

FRANK O. TAYLOR, PH. C.

In view of the fact that the American Pharmaceutical Association is meeting this year (1914) in the recognized center of the pharmaceutical industry in America, the Secretary of the Historical Section suggested that a brief history of Parke, Davis & Company, and some account of their connection with advances in pharmacy and medicine would be appropriate to the occasion, and of special interest to all those present who have made a tour of inspection through these laboratories.

To you gentlemen, who, in your daily work, have reason to be familiar with the preparations of Parke, Davis & Company, it is almost unnecessary to speak with regard to present conditions and you are, in a measure, familiar with the extent of these laboratories and the purposes that animate them. It is, however, probable that many of the present members of the American Pharmaceutical Association are not familiar with the early history and growth of this firm and particularly the connection it has had with the development of pharmaceutical preparations; so it will not be amiss to give a brief account of the firm itself before speaking of its connection with medicinal progress.

DEVELOPMENT OF PARKE, DAVIS & CO.

Up to the time of the early sixties it had been the almost universal custom for each pharmacist to prepare for himself such galenical preparations as he needed, but about this time several firms began manufacturing work on a small scale, developing this in most cases in retail drug stores that had been established for some years. The idea of centralized manufacture of medicinal preparations was just in its infancy and was probably not recognized as such at that time, but there seemed to be a field for such a firm, and Dr. S. P. Duffield, after having previously entered into two brief partnership arrangements with other men, formed a co-partnership with H. C. Parke on May 7, 1867. This firm continued to do business until 1869, when Dr. A. F. Jennings bought out the interest of Dr. Duffield and the firm became Parke, Jennings & Company, George S. Davis being one of the company. On November 16, 1871, Dr. Jennings retired from the firm and it became, for the first time, Parke, Davis & Company, existing as a co-partnership, and continued as this until January 14, 1875, at which time, as it was developing rapidly and it seemed desirable to perpetuate the firm in some form better than a

* Read before Historical Section, Detroit, 1914.

co-partnership, it was incorporated with a capital stock of $125,000, of which $81,950 was paid in.

All this time the laboratory had been located at the corner of Cass and Henry Streets, Detroit, with an office at the same place, and not until 1875, about the time of incorporation, was it moved to its present location. At this time the office was moved to 52 Larned Street, West, where it remained until 1877, when it was transferred to the site of the present laboratories. From this time on the laboratories gradually increased in size until at present they cover several blocks and have, besides their Detroit laboratory, branches in Canada and England, where manufacturing is carried on, and branch offices in almost all parts of the world.

Guiding Principles:—The tendency of modern business has, for many years, been to emphasize the necessity of absolute integrity, both in fact and in spirit, in all dealings, and this idea that has begun to very thoroughly permeate all our business institutions was, it seems to me, one of the chief reasons for the rapid and permanent growth of a business that begun so short a time ago and has increased so tremendously. I can not better illustrate what I mean than to quote from a little leaflet printed many years ago when the firm was young, setting forth their beliefs, and which they entitled "Our Creed and Code":—

"We believe, that, in combating disease, only the best quality of drugs is permissible, and that to their manipulation should be applied the highest scientific skill.

"We believe that the issuing of inferior medicines of any kind is unjustifiable from any point of view.

"We believe in standing solely upon the intrinsic merits of our preparations, and in making no false pretenses; in doing the best that scientific knowledge and skill will accomplish and in doing it honestly and faithfully.

"We believe in working fully in harmony with our pharmacal and medical friends, and in gratefully accepting any suggestions that may tend to our mutual profit. Our watchwords are *Purity, Accuracy, Reliability.*"

Historical Periods:—The history of Manufacturing Pharmacy as a whole and of Parke, Davis & Co., may be divided into four periods characterized by the most important activity of the time, which periods are practically identical in date especially the last three, as this firm in each of these was the leader in the special work involved. These periods are as follows:—

1. Formative Period—1867 to 1874.
2. Botanical Research Period—1875 to 1882.
3. Standardization Period—1882 to 1894.
4. Biological Period—1895 to present time.

These are of course not sharply defined, the work characteristic of each of the last three was in the course of development for some time before the dates assigned and the appearance of a new line of work by no means indicated a termination of previous endeavors, in fact, it frequently widened the scope of all investigations. For these reasons we cannot deal with each period by itself except in a general way, but in most cases trace each line of products or development of process through its entire history. For want of time these accounts must perforce be brief as possible.

Fluid Extracts:—The first products manufactured in the early laboratory were a few chemicals and a line of fluid extracts, and it is interesting to note that the

firm considered the process of maceration of the drug with the menstruum and extraction by hydraulic pressure as the most satisfactory one, as it avoided the use of heat in concentrating weak percolates. It is true that quite a while before this, the process of percolation had been introduced, but the firm, feeling that the experience with this method which they and others had so far acquired, was not sufficient to insure it giving the best possible fluid extracts on a small manufacturing scale, and also being fearful of the vacuum apparatus of that time, decided to adhere to the older method for some time longer and in one of their early price lists state, "We neither percolate nor use heat in any form whatever."

In 1882 a combination process involving percolation as well as maceration was evolved, and this in a few years gave way to percolation exclusively. At the present time, as everyone knows, the process of cold repercolation has been so carefully worked out that it is the best means of extracting drugs and the most economical of solvents used. To the simple percolation by gravity there is now, in many cases, added the use of compressed air, which, besides hastening the percolation, renders it more thorough by forcing the menstruum into the structure of the drug.

After the business had been organized and acquired a little momentum through a few years of experience, the members of the firm began to look around for new things that would be both useful to pharmacists in general and profitable to themselves. As fluid extracts of various drugs were so widely used, it was but natural to look for unknown or little used plants that might be of medicinal value, and to this end, a systematic search was begun about 1874, which continued for many years, and gradually developed along other lines. If a new plant was heard of from the far west of the United States or some foreign country, if the suggestion was made by any physician through correspondence or by a published paper as to the efficacy of a heretofore unused plant, it was immediately investigated and if it gave promise of being really useful, supplies were obtained and the fluid extract distributed to physicians.

Botanical Research:—At this same time, through these same years, an immense volume of literature was prepared by the firm from the reports of physicians and other scientific men all over the country giving detailed accounts of the botanical character of the new drugs and their medicinal properties. Some few well-known preparations are generally recognized as having been introduced by Parke, Davis & Company, but it may surprise you even as much as it has the writer, to find how many drugs now prominently known, were originally brought to the attention of the medical profession by this young firm, especially when it is considered that at the time they were doing this work, the financial outlook was anything but pleasing, as the influence of the panic of 1873 was still strongly felt.

In the course of these investigations Parke, Davis & Co., through representatives, explored the northern parts of California, Washington, Oregon, British Columbia and Mexico. One representative was sent to the Fiji Islands to obtain a supply of the drug Tonga; another going to the West Indies brought back Jamaica Dogwood and a few other less important drugs. A special representative, dispatched in 1881, made a trip from the mouth of the Amazon River about 2500 miles into the interior, and as a result of this expedition the drug Manaca

was added to the growing list of new remedial agents. About the same time another representative proceeded inland from Buenos Aires on horse-back clear across the mountain range to the Pacific coast. This work resulted in the discovery of the herb Chekan, and the obtaining of supplies of Boldo, Quebracho and some other Chilian drugs. In 1885, Dr. H. H. Rusby made an extensive trip in South America, in the interests of Parke, Davis & Co., as a result of which he brought back much scientific information and among many other plants the drugs Pichi and Cocillana, together with obtaining extensive supplies of Coca from Peru.

As you are aware it is almost impossible to locate absolutely the first medicinal use of a drug that has been known for years and a distinction must be made between the one who may first find a medicinal use for a plant and him who makes this common knowledge or brings a drug from obscurity to a place of more or less prominence in Materia Medica.

The somewhat extensive list following includes all but a few drugs of evanescent usefulness that have been introduced to medical use by Parke, Davis & Co. In all cases preparations of these drugs were practically unknown in the United States except as they may have had a very restricted local use and some of the most important ones were absolutely new to the medical profession, as for example, Cascara, Yerba Santa, Berberis, Grindelia, etc. The writer has spent considerable time going over old literature of the firm and other journals to verify as far as possible, the priority of introduction of these drugs and has found a number for which the firm does not ordinarily claim credit that they seem to have been chiefly instrumental in introducing, at least in the United States. It has not been possible to make a complete search of journal literature and find the earliest mention of all these drugs but the dates given being those at which the Fluid Extracts were first put on the market by Parke, Davis & Co., undoubtedly are the first appearance of such preparations of all these drugs. The names in italics, are drugs recognized in the U. S. P. eighth revision.

1869—*Black Haw.*
1874—*Guarana.*
1874—*Eucalyptus Globulus.*
1874—Bearsfoot.
1875—*Coca.*
1876—Cereus Grandiflorus.
1876—*Muskroot* (*Sumbul.*)
1876—*Jaborandi* (*Pilocarpus.*)
1876—Sundew
1876—Evening Primrose.
1876—Bladderwrack.
1876—*Damiana.*
1876—*Yerba Santa.*
1876—*Grindelia robusta.*
1876—Sandalwood.
1877—*Grindelia Squarrosa.*
1877—Ustilago Maydis.
1877—Kava-Kava.
1877—Ailanthus Glandulosa.
1877—Urtica Dioica.
1877—*Berberis Aquifolium.*
1877—Boldo Leaves.
1877—*Cascara Sagrada.*
1877—Five-flowered Gentian.
1877—Kamala.
1877—Guaco.
1877—Paraguay Tea.
1878—Cedron Seed.
1878—Coto Bark.
1878—Cereus Bonplandii.
1878—Quinine Flower.
1878—Areca Nuts.
1878—Shepherd's Purse.
1878—Yerba Reuma.
1878—Great Laurel.
1878—Indian Blackroot.
1879—Jamaica Dogwood.
1879—Rhus Aromatica.
1879—Manaca.
1879—Quebracho Bark Powd. F. E., 1881.
1879—*Saw Palmetto.*
1881—Tonga.
1881—*Corn Silk.*
1882—Sierra Salvia.
1882—*Convallaria.*
1882—Cheken.
1886—Pichi.
1888—Cocillana.
1908—Cannabis Americana.

As I have said, some of these drugs had been used in their local habitat for a long time, as for example, Coca, which had been known for centuries in Peru and used widely in the mountains of South America, and its chemical constituent had been investigated in Europe, but it had not been introduced into this country to any appreciable extent. Again, Manaca had, prior to 1879, been recognized in the Brazilian Pharmacopœia, but was practically unknown outside this country and had not been used in the United States. Sandalwood has, of course, been known in India for centuries, but its medicinal use, especially in the form of a fluid extract of the wood, had received practically no attention in the United States.

It is interesting to note at this time that of the total number of drugs mentioned, twenty of them are at the present time recognized in the United States Pharmacopœia or National Formulary, and thirty-two of their fluid extracts are still in sufficient demand to warrant manufacture by Parke, Davis & Company. Another interesting feature is that the majority of these drugs appeared within three years, viz., 1876-77-78. Altogether approximately fifty different drugs have either been introduced as entirely new by this firm, or have been taken from great obscurity and brought to some degree of prominence.

Publications:—Closely associated with the introduction of new remedies was the dissemination of knowledge concerning them, and so from occasional bulletins giving information on this subject, there gradually developed a systematic series of publications. A Publication Department was organized entirely independent of the manufacturing and sales work, and journals dealing with pharmacy, therapeutics and surgery in their purely scientific aspects began to be published, not all of them at once, but in the course of time.

From the early bulletins there first developed a journal entitled "New Preparations," beginning in January, 1877, and published quarterly for this and the next year, and then monthly during 1879. The legend on the title page indicates its purpose, viz., "A quarterly journal of medicine devoted to the new therapeutical agents." In 1880 the scope of this publication was modified somewhat, and its size increased, and it began to be published as "The Therapeutic Gazette" devoted exclusively to therapeutics. From that time since, it has continued to the present day as one of the well known medical publications of the country.

As a publication of a different and more local character, there began in 1877 "The Detroit Lancet" which, in 1886, was changed to "The American Lancet," and so continued until 1893.

In January, 1883, another journal entitled "The Medical Age" was begun which, as referred to on the title page, was "A semi-monthly journal of medicine and surgery." The publication of this continued until the close of 1906, at which time it was incorporated with The Therapeutic Gazette.

In April, 1895, a somewhat similar journal was introduced under the title "Medicine" which was a monthly journal of medicine and surgery. In January, 1907, it was also combined with the Therapeutic Gazette.

These facts are probably generally known, but it may not be so well understood that for many years this firm were the publishers of the Index Medicus of world-wide reputation. A brief statement of the vicissitudes of this publication may not

be amiss. It was started in 1879 under the editorship of Dr. J. S. Billings of the U. S. Army, and Dr. Robert Fletcher as his assistant, and published by F. Leypoldt in 1884 of New York. It continued thus until the death of Mr. Leypoldt in 1884, when an announcement was made that it would be discontinued, as it had been published at a considerable loss, and they did not know of anyone who would finance it. After three months intermission, it was taken over by Mr. George S. Davis, representing the Publication Department of Parke, Davis & Company, brought up to date in the first issue of 1885 and continued to be published under these auspices until April, 1895. The publication was then taken over by the editors and after some other changes during the next few years, it was finally placed in the hands of the Carnegie Institute in 1903, where it now remains.

As exclusively related to pharmacy and of interest to pharmacists, there was begun in January, 1887, "The Druggists' Bulletin" which was stated to be "A monthly Epitome of Pharmaceutical progress and news." Starting with a very small beginning, it continued under this title until the close of 1890, when it was changed to "The Bulletin of Pharmacy," as which it is now well known to you all.

Of these various publications, the two which now remain as a sifting out of that which has gone before are "The Therapeutic Gazette" and "The Bulletin of Pharmacy."

Standardization:—As the activity in the search for new drugs began to wane, there appeared the forerunner of what, it seems to me, is the most important advance in pharmacy that has occurred in modern times, viz., the application of the principle of standardization, or uniformity in production of preparations of drugs. With no flourish of trumpets and little realization of what is heralded, in September, 1879, there appeared a preparation known as Liquor Ergotæ Purificatus, which was a fluid preparation of ergot, standardized by a simple form of assay so that each different lot was of uniform character. The assay appears to us, at this day, as very crude and inefficient, but we must remember that this was simply the beginning, and any kind of an attempt to give uniformity of strength was an advance upon untraveled ground.

According to the best researches of the time, the activity of the ergot was supposed to be chiefly in the sclerotic acid, and a crude estimation of this was made by the precipitation of the organic acid with lead acetate. The standard was this: "Ten cc. of the normal liquid require for complete precipitation, 100 cc. of a solution containing 1% of crystalized lead acetate."

This truly appears to us with the retrospect of forty-five years of experience, as almost laughable, but it was the best that the knowledge of the times afforded and was a step toward the dreams of the future which were beginning to take form in actuality. With this there began a systematic investigation of the possibility of rendering uniform, fluid preparations of many drugs with the result that in February, 1883, there was publicly announced a list of twenty normal liquids which were actually fluid extracts standardized by some form of assay, in most cases an estimation of the alkaloids which they contained. The man responsible for the beginning of these assayed fluid extracts and who established

the analytical methods for their control is Dr. A. B. Lyons, to whom in this, as in many other things, pharmacy owes much.

The process for the determination of the alkaloids chiefly employed was the now obsolete method of titration with Mayer's reagent, but it is evident that the years from '79 to '83 had been well spent, when we note that the alkaloidal standards of strength adopted for preparations of "normal liquid belladonna" leaves and root were, in each case 0.44% of alkaloid and the present U. S. P. standard for fluid extract belladonna root is 0.4 and for the leaves 0.3%, the "normal liquid ipecac" was 1.5% alkaloid, the same as now official for the fluid extract. The standard for "normal liquid nux vomica" was a little lower than the present U. S. P. standard for fluid extract, it being then 1.5% of total alkaloids as against 1% of strychnine at the present time. This last mentioned fluid is chiefly interesting for the fact that the assay process more nearly approximated that used at present than any other, it being carried out by adding a few drops of dilute sulphuric acid to the liquid, evaporating off the alcohol, washing the residue with ether, taking it up at the same time with water, finally rendering alkaline with caustic soda, shaking out the alkaloid with a mixture of chloroform and ether, and weighing the product so obtained.

Of the further development of the chemical standardization of drugs and their preparations it is almost unnecessary to speak, but it is worthy of notice that the work instituted by this firm and followed in later years by a host of helpers has always kept far in advance of the official requirements of the various Pharmacopœias as they have been established.

As an extension of the work of standardization of drugs and their preparations, there appeared, with the beginning of the biological period in 1894, the first fluids that were standardized by physiological assay as distinct from any chemical assay. It is an interesting coincidence that the first fluid so standardized was also the first one whose uniform production had been attempted by a chemical assay, viz., fluid extract Ergot. Following this there came, at intervals, standardized products of a number of other drugs, such as the various heart tonics with which you are entirely familiar. The development of different methods of physiological test is outside the scope of this paper, and has been described extensively in other publications. Suffice it to say that this general principle, whether applied along chemical or physiological lines, has undergone many changes with the establishment of improved methods of work, and still gives promise of much further development that will widen its present extensive scope.

Going back now to an earlier time, let us consider very briefly some of the different lines of pharmaceutical manufacture that have been developed. It would require too much time and space to treat separately and in detail different lines of products like pills or tablets or ampoules, etc., and so perforce they must be considered very briefly, emphasizing only the most salient features of improvements that from time to time have been made in their preparation.

Tablets:—There have been many interesting features in connection with the development of tablet manufacture, but none of them are such that they can be called important advances in pharmaceutical manufacturing, and it is only necessary to say that the gradual development of this line of products during the years

that they have been in vogue has had to do chiefly with the mechanical perfection of the tablets, their speed of solubility or disintegration, and detailed knowledge about how best to handle an almost infinite variety of substances used in them.

The most important manufacturing advance has been the development of new machinery, so that where originally a few tablets might be made by the retail druggist by hand and later by a machine giving a single tablet at each impression, we have now especially designed machinery such as has been built in the machine shops of Parke, Davis & Co., which have a capacity of a million and a half tablets per ten-hour day. This development has recently been described at length by Dr. L. E. Kebler in his paper presented to this association last year.

Pills:—The origin of pill manufacture in a small way is lost in obscurity. By this I mean the preparation of pills by the retail druggist. It is very natural, therefore, that on the manufacturing scale, it should be one of the first products made, together with the fluid extracts of drugs. Here again the development of the product coincides with the development of automatic machinery, and you are all of you well informed regarding recent improvements in such machines. The strides that have been taken measure up well with those in tablet manufacture. Where their production was formerly, by hand, limited to a few thousand per day, a single machine will now turn out anywhere from five hundred thousand to two million pills in a day, depending upon the size of the pill. The old method of gelatin-coating pills by impaling them on pins and dipping in gelatin solution was done away with by Parke, Davis & Co. when they originated the machinery for holding the pills by vacuum while being dipped.

The most important modification of pills in the last few years is the introduction of the so-called "Soft Mass Pill," so made that the interior is quite soft and protected by the hard shell of the coating, just thick enough so that the entire pill may be easily crushed between the fingers. This pill is made by the mass process and retains its softness for many years.

In this connection it is interesting to note that Parke, Davis & Co. who introduced this pill in 1909, evidently felt that this was a desirable attainment a great many years ago, as back in 1875, they are careful to state that their pills are especially desirable because they are "coated while the mass is yet soft." At that time, however, the idea of the soft mass was not at all what it is to-day.

Pepsin:—The extensive use of digestive ferments is of comparatively modern origin, and this firm has had very much to do with the development of pepsin manufacture and rendering the use of this digestant popular and convenient. The introduction of different strengths of pepsin as made by Parke, Davis & Co. may be considered as identical with the development of pepsin manufacture thus indicated.

In 1874 they introduced a Saccharated Pepsin of such a strength that "five grains would digest sixty grains of coagulated albumin," being thus of a 1:12 strength. This was considered a very excellent product, although so weak that it would be counted as worthless to-day, and thrown away as waste. The mixture of the Pepsin with milk sugar was necessary because of the exceedingly hygroscopic nature of Pepsin thus made, owing to the presence of a considerable amount of peptone, which they had not yet learned how to separate from the Pepsin. In February, 1881, there appeared a pepsin of which they were rather

proud, which was dignified with the name "Concentrated," it being so strong that one grain would digest 100 grains of coagulated albumin, but this achievement was very quickly improved upon so that in February, 1883, there was presented a so-called "pure" pepsin, which was stated to have an activity of 1:450 to 1:500. In the meantime, the U. S. P. of 1880 had appeared and had made official a Saccharated pepsin with a strength of 1:50. About the same time some one got the idea that pepsin prepared from sheep stomachs, was in some way better than that prepared from hogs stomachs, so with the idea of being fully abreast of the latest developments the firm put out at this time a so-called pure Sheep Pepsin having a strength of 1:350 to 1:450. This sheep pepsin was short-lived, however, and in a few years was again taken from the market as there was no reason why it was any better medicinally than the established variety. In January, 1885, the development of pepsin had proceeded to such an extent that the peptones could be largely removed and the pepsin produced in a scale form which is now so universally known. Between this and the year 1888 continued researches brought about a tremendous advance and in that year a pure pepsin in scale form free from peptones and marked "Non-hygroscopie," (which it certainly was as compared to previous productions) and having a strength of 1:2000, was placed on the market; also a powdered pepsin of the same strength was supplied, and for the first time there appeared a solution of pepsin in glycerin called Glycerole Pepsin, of such a strength that one minim would digest 100 grains of coagulated albumin.

There was now no further change in commercial supplies of pepsin until 1893, at which time as the result of continued and rather epoch-making experiments, there were placed on the market a line of pepsins of different strengths in scale form, including 1:2000, 1:3000 and 1:4000 strength, a glycerole pepsin having a strength of 1:300 and while not regularly listed, it was arranged that supplies of pepsin having any strength up to about 1:15000 would be furnished on demand. The next year, 1894, appeared the 1890 Revision of the U. S. P. which made official a pepsin of a strength of 1:3000 and a saccharated pepsin of 1:300, which have remained to the present time as the official standards.

At the same time, with the development of the pepsin manufacture, there has gone with it hand in hand the development of methods of testing pepsin, and while the strengths of pepsin as claimed many years ago were approximately correct, they are certainly not the same as would be shown by our present day methods of assay. The pepsin supplied even up to as late as 1890 or 1893 was probably much weaker than would be indicated by our present methods of assay. The general idea of the test has not varied greatly, but our experience has increased and our interpretation of results has been modified. This is very forcibly shown by the fact that quite recently a test was made of a sample of pepsin prepared about twenty years ago and which, at that time, was considered to be 1:20000 strength. This has been kept under the best possible circumstances, so that deterioration that had occurred was certainly very little, but the test showed that it would now be considered only about 1:10000. The fact that the U. S. P. standard has not varied for almost twenty years past does not indicate that there have not been advances in this length of time for I am able to show you to-day a

sample of pepsin testing 1:25000 by present tests, which is therefore, approximately five times as strong as the pepsin prepared twenty years ago. This high powered old sample was more the result of good luck than accurate knowledge and it was practically impossible to duplicate it, but this new sample can be duplicated at any time, although, of course, the expense of making so powerful a product would be considerable, but strengths of 6000, 8000 and 10,000 are easily made.

As in the manufacture of extracts of drugs, so in pepsin manufacture the development of highly efficient vacuum apparatus has had much to do with the improved processes.

Pancreatin:—As closely associated with pepsin, we naturally think of the ferment Pancreatin. Here the development has not been so spectacular as in the case of pepsin, but it is nevertheless considerable. In 1877 a saccharated pancreatin was placed on the market, for which no standard of strength was given, there being no recognized way of determining the strength at that time.

In February, 1881, there appeared the following test which, crude as it was, attempted to give some definite information about the product; "Ten grains will emulsify ½ to 1 oz. cod liver oil with water in sufficient quantity." This test was continued as a standard until 1884, at which time a so-called "pure" pancreatin and also a liquid concentrated pancreatin were put on the market, the first of which being of such a strength that five grains would peptonize one pint of milk in half an hour, and the latter required two fluidrachms to accomplish the same results. The same standard of strength, as far as the peptonizing of milk is concerned, remains to the present day. The Eighth Revision of the U. S. P. established a starch conversion test requiring that one part of the pancreatin should be able to digest 25 parts of cooked starch.

The development of a commercial pancreatin supplied by Parke, Davis & Co. since the introduction of this Pharmacopœia has gone to such an extent that its regular product now has the ability to digest 150 parts of starch for each part of pancreatin.

Taka-Diastase:—For many years it was known that a ferment, having some digestive action on starch, was produced during the growth of various fungi. Researches, both in Germany and Japan, began to develop considerable information on this subject, and in 1895 the first medicinal application of a ferment of this kind was made, when Parke, Davis & Co. introduced Taka-Diastase as a result of the researches of Dr. Takamine. As first supplied it had the power of digesting or converting into assimilable substances one hundred times its weight of starch, but, through continued research, it has been possible to greatly increase its digestive activity, so that, at the present time, it has three times its original strength.

Capsules:—Turning now from medicinal products to what may be considered accessories in pharmaceutical practice, we would note especially the development of empty capsules. These were not original with this firm, having been first prepared in a very crude form by A. Mothes, a French pharmacist, in 1833, and first made in the U. S. by H. Planten in 1834 or 1835, but they were not recognized as being particularly valuable, and no perceptible advance was made in their

manufacture for many years, and the history of the greatest development of capsule manufacture is coincident with the connection of Parke, Davis & Co. with their production. In early years the firm did not actually own the plant, but they controlled the entire output of an associated factory, which was to all intents and purposes their own.

The first capsules which they listed were in 1875, and consisted of three sizes, what are now known as Nos. 1, 2 and 3. They were still rather crude, but an attempt was made to give them a smooth and transparent appearance, and to produce a body with cap slightly larger so that they would fit properly together, and the gelatin used was the best obtainable at that time, as at present. The novelty of the empty gelatine capsules is very well shown by the description of them in advertisements in the late '70s, such as the following: "Our capsules are composed of two small tubes of prepared gelatin, one sliding into the other, and each closed at one end. The remedy employed is then separated into the proper dosage, one of which is placed in the smaller tube, which is then telescoped into the larger. It is now in the shape of a small cylinder, ½ inch in length, ¼ inch in width, closed at both ends," or the following: "The gelatin on being moistened becomes slippery and is readily swallowed with the aid of a little water."

Though they were so little known to the pharmacist the public knowledge of them was even less, as was evidenced by an item in the Louisville Medical News in 1877, where a physician states that an intelligent gentleman had been given capsules to take without specific directions, and later informed the physician that he "did not like them at all," his idea of taking them being "to peel off the hulls and put the stuff in water."

From a very slow and laborious process, the manufacture of empty capsules has come to be one of speed and remarkable perfection, and nowhere can be found a more wonderful development of special machinery than is connected with the capsule industry. More space could be given to this alone, but for further information, which it is impossible to include here, reference may be made to the article by Warren Wilkie in the Bulletin of Pharmacy, 1913, page 382.

Biological Manufacture:—We come now to what we have called the fourth period in the development of manufacturing pharmacy, viz., the biological period, and use the term in a broader sense than it is popularly employed. In this connection one naturally thinks of vaccine for producing immunity against smallpox, but this was developed nearly one hundred years before the appearance of antitoxins or bacterial vaccines.

On the border line between medication by drugs of mineral or vegetable origin on one side, and products derived from bacteria on the other, lie a number of animal substances which modern materia medica includes, as some of its most potent agents. Substances that, to one unfamiliar with the trend of medical research through the last twenty years, would seem to savor of the necromancy of the middle ages. The results obtained from the various products of the so-called "ductless glands," have been so remarkable that they have attracted considerable popular attention, and have, in some cases, almost revolutionized the medical treatment of obscure and hitherto baffling diseases. This work, very naturally,

began first, with the use of the desiccated glands themselves, followed, almost immediately, by attempts to isolate some definite active principle. As a result of this, first, and so far, most important, there was isolated by Dr. Takamine, the active principle of the suprarenal gland, Adrenalin, which became commercially available in January, 1901. Since that time it has risen rapidly into the very front rank of important remedial agents and it needs no further statement concerning it in this connection.

As a more recent and almost equally important work, though in somewhat different line, there has come the commercial development of an extract of the pituitary gland, known by this firm as Pituitrin, and supplied first in 1909, embodying the active constituent of the posterior lobe of the gland. The exact nature of this active principle has not yet been definitely determined, but at the present time much attention is being paid to it and also to the value of the anterior lobe of this gland, for a long time discarded and considered of no value.

Along with the use of these two glands medicinally, there has come about also the use of the thyroid gland, either in desiccated form or as some especially prepared substance derived from it. The thyroid gland has been under investigation for many years and the exact nature of its active constituents is not yet understood, but there probably remains, in the future, much knowledge of this gland that will be of even greater value than that possessed to-day.

The gradual development of definite therapeutic uses for a number of other glandular products is now in progress, most prominent among which may be mentioned the Pineal and Para-thyroid glands, but what shall be the results of this, as regards the isolation of any definite active body or a thorough understanding of their uses, and the employment of them in therapeutics, is yet chiefly a thing of the future, although apparently not far distant.

What shall be the ultimate result of the study of these glandular products will remain for some historian of many years to come to set forth.

The commercial beginning of what is generally spoken of as biological work was in 1894, and the events that preceded it are worthy of a moment's notice. In 1887 Professor Sewall of the University of Michigan directed attention to the immunization of pigeons against rattlesnake venom. This is probably the first published reference to the establishment of immunity. Following this, during the next six or seven years, there appeared a number of papers dealing with the establishment of immunity against various poisons, such as ricin, abrin, etc. of vegetable origin, and toward the close of this time there came the epoch-making work of Roux, Behring, his assistant, Kitisato and Aronson. The publications of Behring and Roux really mark the beginning of the idea of producing, on a manufacturing scale, a substance that would produce immunity to diphtheria and other diseases which were of bacterial origin.

The firm of Parke, Davis & Co. early saw the possibilities in the field so opened up and in 1894 established, in a small way a department for pharmacological work and for the production of diphtheria antitoxin. The first equipment was small, and the total number of animals included a few guinea pigs for necessary tests and three horses for the production of the antitoxic serum.

Early in 1895, public mention was made of the fact that they would, in a very

short time, be able to supply diphtheria antitoxin, and by 1896 three different packages were on the market, viz., one containing 600 units, one of 1000 and one of 1500. The next year a bulb containing a prophylactic treatment of 250 units was placed on the market, and one of 2000 units.

In 1898 appeared, for the first time, a package containing 3000 units and from this time on, for some time, the strength of dosage was not greatly increased, but the effort was made to cut down the amount necessary to obtain the same potency. Very considerable advances along this line had already been made. The first serum made contained about fifty to sixty antitoxic units per cc., but very quickly the strength of the serum was increased, and it is a notable fact that one of the most potent serums was taken from a horse used in 1898, this serum being so powerful that one cc. contained 2000 antitoxic units. At that time, the reasons for this remarkable potency were not well understood, but it seems now that it was due to some unknown difference in the animal, as great variation is found in the serum that is obtained from different animals. Since that time the continued effort has been to increase the potency of the serum by concentrating it in some way after it is first obtained, as the result of which the so-called serum globulins or concentrated serum have been supplied, which now contain a very much larger number of antitoxic units.

In 1897 antistreptococcic serum, and in the same year anti-tetanic serum both in liquid and dry form, were placed upon the market. An anti-tubercle serum appeared in 1898, and in 1899 and 1900 respectively there appeared, for veterinary use, two new products, blackleg vaccine, and anthrax vaccine, which were of a different type and are more closely related to the bacterial vaccines of later development than they are to serums.

The brilliant and rapid development of bacterial vaccines is of such recent date that all of you are well acquainted with it, and there is no need to do more than to record the fact that it has its origin in the work of Sir A. E. Wright and that the first commercial preparation of bacterial vaccine was made by Parke, Davis & Co. in 1907. Since that time the number of them has greatly increased, and the development has been so rapid and is still going on to such an extent that these productions can not properly be treated in a historical paper as they have not yet the antiquity that renders them of historical nature, but are a very present and active force in pharmaceutical work.

As the latest addition to biological products for medicinal use, we come to the phylacogens which give promise of having an even more brilliant future than their precursors, the bacterial vaccines, but again these are of so recent origin that they are not appropriately treated in a paper of this type, and can only be mentioned.

In taking a general survey of the pharmaceutical industry from a manufacturing standpoint, one of the most striking developments is that of the apparatus and machinery employed and the use that has been made of machines originally designed for other industries. It is characteristic of the development of medicine and pharmacy in general that they have been quick to take advantage of knowledge gained from every available source and this has been especially true of apparatus employed.

We have already noted something of the remarkable development in special machinery in the manufacture of capsules, pills and tablets, all of which are peculiar to the manufacture of medicines, and one could very easily deal with the development of this machinery entirely apart from any of the products and processes themselves. Aside from the special machines just mentioned, probably no one thing has had so much effect on medicinal products as the great improvement in different types of vacuum apparatus in the last fifteen or twenty years. Vacuum stills for the recovery of liquids or the concentration of fluids where the solid residue is desired, vacuum dryers for the handling of products such as dry extracts of drugs or granular effervescent salts, and even the use of vacuum pumps for filtration, for the handling of liquids in quantity and numerous other minor purposes make it unusually important in a wide scope of work.

From the baking industry we have taken over the type of mixers there used as being the best for pharmaceutical processes; from the flour mill we have adapted the roller mills to be used in handling tablet granulation; from the liquor industry we have adapted stills and vacuum pans of various forms; from the laundries we have taken special types of centrifugal machines; from the sugar industry, centrifugal machines of different design for other purposes, from the manufacture of confectionery we have derived lozenge machinery and notably the type of pans for sugar-coating pills and tablets which are the same as have been used for sugar-coating nuts; from the paint manufacturers we have taken over the mills for grinding paints and put them to use for grinding ointments and have taken their automatic filling machinery for use in filling tubes of tooth-paste ointments, etc. In fact, wherever a machine has been found that could, in any way, be adapted to pharmaceutical practice, it has been done, and used as it was, or, as frequently the case, after some modifications.

It is sometimes hard for the historian to refrain from assuming the role of prophet, but it is plainly evident to all that a great change in medicinal preparations is occurring, the old galenicals in many cases giving way to products from the biological field, and it requires no seer with supernatural vision to see still greater changes in the future, both in materials and methods, and the establishment of a more potent and definite materia medica.

Laboratories of Parke, Davis & Co.

STATES HAVING RECIPROCAL REGISTRATION.

The following states now have reciprocal license privileges for pharmacists through the work of the National Association of Boards of Pharmacy:

Active—Alabama, Arkansas, Arizona, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Mexico, North Dakota, Oklahoma, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin.

Associate—Colorado, New York, North Carolina, Pennsylvania.

Any information desired about reciprocal registration may be secured from H. C. Christensen, Secretary N. A. B. P., No. 150 Bowen Avenue, Chicago, Illinois.

THE STUDY OF THE HISTORY OF PHARMACY BY STUDENTS OF PHARMACY AT AMERICAN INSTITUTIONS OF LEARNING.*

EDWARD KREMERS.

1. The object of the course which has been given in alternate academic years for a number of years past is indicated in the following Prefatory Note to the Bibliographic Guide to the history of pharmacy which has been prepared first of all for his own students by the writer.

"As the title indicates, this brochure makes no pretense at being a complete bibliography to the history of pharmacy, much less does it presume to be a history of pharmacy. The sad fact is that we have no real history of pharmacy, indeed never have had one. However, we have a number of excellent historical treatises on pharmacy, a literature that has made excellent progress during the past two decades. Unfortunately, most of these treatises are not available to the average American pharmacist or student of pharmacy because of the foreign languages in which they have been written.

"Appreciating the broadening effect which even a cursory study of the history of pharmacy by the pharmacy student must have on his necessarily technical course of education, the writer has always sought to interest his students in the evolution of their calling. Some years ago this endeavor took on the form of weekly lectures which, so far as possible were illustrated by lantern slides. In order that the impression thus produced might be more lasting, these lectures have been supplemented by topics, some of which enabled the student to acquaint himself with important details that were, of necessity, omitted from the general survey of the lecture. This topic work also necessitated some acquaintance, on the part of the student, with the books available in the university library. Synoptical bibliographic sheets resulted as a practical expediency, and from these the present bibliographic guide. It is the hope of the writer, that in their present form these notes may prove of use not only to his own students, but also to some of his colleagues who appreciate the importance of historical study of the natural sciences by professional students."

Scope of the Course:—Our pharmacy courses being already overcrowded on the side of technical information, but little time is left for such a course as this. One meeting a week, though for both semesters, necessarily implies great restriction. Such a course must of necessity be very general and avoid all detail that is not essential to illustrate the general principles that should be emphasized.

For reasons that become apparent by reference to the brief chapter on Classification of the Guide, the history of pharmacy is taught as an aspect of the history of civilization. Hence the course of following the periods of general history is followed. In each period only such countries are selected as teach a special lesson. Thus, for the period of antiquity, Egypt, Greece and Rome must suffice; for the middle ages, the Arabians. Of the modern period, Italy and France are selected as typical Romance countries; Germany and England as typical Germanic countries.

* Abstract of paper read before the Historical Section at the Detroit Meeting of the A. Ph. A.

The first semester having been given to the study of the development of pharmacy in the old world, the second semester is devoted to the study of pharmaceutical history in the United States. The earlier developments of pharmacy in this country are traced back to the institutions of France and England, the later developments to those of Germany introduced during the second half of the nineteenth century.

In addition to these general considerations, special subjects such as pharmaceutical economics, organizations, education, etc., are studied in connection with these special chapters of the history of the United States, but in each case the beginnings are traced back to their European origin. This affords an opportunity to review some of the general aspects in their application to those special topics. Pedagogically, this is important, particularly since the line of thought involved is rather foreign to students pursuing courses that are almost exclusively scientific and technical.

Methods of Instruction:—In a course such as the one outlined, which of necessity belongs to the inspirational rather than the informational type, the lecture naturally is the dominant feature. Its object is not so much to impart fragments of information about this or that which may be directly useful to the future pharmaceutical practitioner. Its principal object is to cause the student to forget, for the moment, his chemistry and botany and to think of himself as a member of a calling, which, in one form or another, has served mankind since the beginning of civilization, and which, no doubt, will survive the storm and stress of the present and continue to serve mankind in the future. If history in general, is or should be the lamp by which our feet are guided, the history of pharmacy as a calling, rather than the history of a certain galenical with its quaint synonymy, ought to teach the prospective pharmacy student more of real value than the imperfect appreciation of chemical laws or the memorizing of doses, however, important both may be.

A lecture course of this sort, no matter how perfect the lecture or how inspiring the lecturer, is apt to induce superficiality unless supplemented by more substantial mental exercise. The topic is as essential as the lecture and when properly conducted will teach even the average American student that his fear of all that is foreign is rather foolish. There is no reason why the student should not learn directly from Scribonius Largus what constituted the *materia medica* of the ancients. From the British Encyclopedia he may get a general notion of the closed corporation, the Guild, and later the college. From similar general sources he may learn about the system of concessions, both real and personal. With the aid of an outline map of Italy, he may be taught to acquire a better understanding of local pharmacopœias, invariably the precursors of the recent modern pharmacopœias, and the close relationship between this class of pharmaceutical literature and the political divisions of humanity into states and nations. In like manner, outline maps of the United States will enable him to trace for himself the development of state associations and state legislation in this country. Moreover, weekly topics may be so assigned in the course of the two semesters, that the student is compelled to acquaint himself personally with at least those sources of historical information written in the English language.

With the modern facilities for supplementing the spoken word by visual instruction, a course of this kind would not be complete without lantern slides or similar means. Much of that which the teacher imparts in his lectures, is largely foreign to the mode of thinking of the average student concerned. The eye must come to the aid of the ear, not only to arouse the interest but to cause the spoken word to be truly understood and appreciated. The material available for this purpose is as considerable as some of it is choice, but it is not readily available even in our larger pharmaceutical libraries. While the money factor involved is by no means prohibitive, it requires love of the subject and patience to bring together a good working collection.

In connection with the reading of this paper an assortment of the different kinds of slides available was shown with the aid of a lantern kindly loaned for this purpose by Parke, Davis & Co., and operated by a member of their scientific staff. The following slides were shown:—

A. PERSONS OF SPECIAL INTEREST TO THE HISTORY OF PHARMACY.

Geber teaching chemistry.
Rhases in his laboratory.
Paracelsus.
Lemery.
Scheele monument.
Latin terms used by Scheele.
La soeur apothicaire Pierrete Monnet.
Joseph Pelletier.
Joseph Bienaimé Caventou.
Das Liebig Denkmal in Giessen.
A. B. Prescott.
Chas. Rice.

B. THE EVOLUTION OF THE APOTHECARY SHOP.

Facade of a Pompeiian house.
Floor plan of store in Pompeii.
A store for the sale of food stuff (Pompeii.)
Dispensary of the monastery Muri (Switzerland.)
Hospital pharmacy, Dijon (France.)
An itinerant drug seller (15th Century, England.)
Pharmacie Anglaise of comeinin (Antwerp, Belgium.)
Lipiciere de village by G. Dou.
Tenier: Chem. Laboratory (Dresden Art Gallery.)
Apothekerkueche des Apothekers, d'Ailly (National Museum, Amsterdam.)
Apothecary shop (From *Hortus sanitatis.*)
Apothecary shop (From J. Amman.)
Apotheke zum goldenen Loewen.
Apotheke in Heppenheim.
Hochzeitschaus, Hamelin (Sertueruer.)
Floor plan of *Farmacia Serravello.*
Kopenhagen. Environs of Kong Salmons Apothet.
Scheele's *Apotheke* in Koeping (Sweden.)
An apothecary's shop (15th Century.)
Chemist, from "Book of Shops."
S. A. D. Sheppard's pharmacy, Boston, Mass.
L. A. Seltzer's (basement) pharmacy, Detroit.
Arzneischrank, (Germanic Museum.)

C. MATERIA PHARMACEUTICA.

Distillation of mercury, sublimation of mercury.
Symbol for sulphur, distillation of sulphur.
Symbol for vitriol, preparation of vitriol.
Symbol for salt, preparation of salt (16th Century.)
Scratching of poppy head (India.)
Opium Saloon (Shanghai.)
Peru balsam.
Gutta percha.

D. PHARMACEUTICAL APPARATUS.

Balance: *Silphionhandel.*
Balance: Roman *Schwellwage.*
Balance: 16th Century.
Chest from Pyx Chapel.
Roman perfume bottles, *unguentaria.*
Unguentaria, etc.
Glass ware.
Glass ware.
Mensa ponderaria.
Mill for grinding olives.
Oil press (Herculaneum.)
Expressing olive oil (Stradanus.)
Still with barrel condenser.
Apparatus described in Adam Lonicer's Distilling Book.

E. MISCELLANY.

"Oldest prescription."
Papyrus harvest, plays and wine harvest.
Scribes with role and pallet.
"The oldest prescription known."
Formula for medicament to drive away witches.
Apprentice's certificate. 1743.
Specimen of practical examinations as master apothecary (France.)
Pharmaceutical pots.
The apothecary of "M. de Pourceaugnac" by Moliere.
Coat of arms of Paris Guild of Apothecaries.
Book-plate of Pharm. Soc. of Switzerland.

Editorial

ERNEST C. MARSHALL, Acting Editor.....63 Clinton Building, Columbus, Ohio

THE PHARMACIST AND THE LAW.

"CALL you that backing of your friends? a plague on such a backing," was the protest of bluff Jack Falstaff to Prince Hal, and one is tempted to sympathize with him and cry out in protest, "God save me from my friends," as he reads the further suggested effort to curb and restrict the already overburdened drug-trade, as embodied in the model law proposed to supplement the Harrison Bill by Messrs. Beal, Freericks and Craig.

Have we not enough law in the Harrison Bill to satisfy any reasonable person? Is it necessary to pile Pelion on Ossa; to add law after law in further effort to declare the members of our profession, enemies to all that is good; panderers to all that is vicious, and willing instruments in the destruction of society, to protect which from their attack, wall after wall of law must be built up?

Out upon such an effort. We have enough to bear, in the Harrison Law, which every good citizen earnestly desires may accomplish much good,—the good results that are postulated, without adding more and more to our burden at the suggestion of the lawyer members of our craft.

Of all the professions in this unhappy world, there is none which brings more trouble to it than that of the law, and the less our profession has to do with druggist-lawyers the better for it.

From the days of Jonadab, "a very subtile man," who gave such foul advice to Amnon, mankind has been cursed by lawyers. Lord Chief Justice Brougham, being asked to define "a lawyer," said "a lawyer is a learned gentleman who rescues your estate from your enemies and keeps it himself." Those who have been charmed with the inimitable sea-tales of Marryat may remember that the most troublesome man on a ship was "a sea-lawyer," and we are tempted to cry out, "Oh, Lord, Lord, save us from our pharmacist-lawyers," for there is a limit to patience and the limit seems to have been reached. The tendency of lawyers is to look solely to laws as a bulwark of defence against all ills. They have no faith or trust in the inherent goodness of mankind, and by this lack of trust they do injury to all, the state and the individual citizen. Chief Justice Marshall is said by many to have done incalculable harm to this country by his construction of the Constitution, and the wrongs wrought by pettifogging attorneys have been prolific subjects for the author and dramatist, and few of us but know of some instance of their baneful deeds. It may be said, without much fear of question, that no class of men have been so dangerous, so pernicious to organized society, so subversive of all that is good in life as the legal fraternity.

Let us have done with law and lawyers for the present. Let us see what good there is, if any there exist, in the Harrison Law. Let us strive earnestly to eradicate the danger to our civilization which its exponents declared imminent. But

for Heaven's sake, let us not attempt to add more and still more law to that, until we observe its operation and effects.

"We must not make a scarecrow of the law,
Setting it up to fright the birds of prey;
But let it keep one shape, 'till custom make it
Our ward and not our terror."

E. C. M.

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WASHINGTON PHARMACY LAW.

THE law proposed in the State of Washington (H. B. No. 135) to regulate the practice of pharmacy seems to be one most excellent, and it contains one feature which might well be copied by all states which suffer from the evils of itinerant vending.

Some of the plans proposed to control or regulate this evil might be well-termed bills to legalize itinerant vending instead of bills to control it, for they are so worded as to legitimize the practice even though they impose some financial restrictions. But in the case of the Washington law the framers of the bill have attacked the evil directly. Sect. 14 of the proposed bill is as follows:—

"It shall be unlawful for any itinerant vender, peddler or any person unless he be a registered pharmacist or registered assistant pharmacist in the State of Washington to sell or offer for sale any medicine, drug, nostrum, ointment, preparation and appliance for the treatment of disease, injury or deformity."

The salutary effect of this section is somewhat, if not entirely nullified however by Section 29 of the bill which allows unrestricted selling of "proprietary medicines or medicines in sealed packages" by any one without restriction as to place or qualification. While a man who has a store is required to obtain a license from the State Board of Pharmacy, any person can sell the same goods from a basket or wagon without such license. Thus, under this law, it would appear that while a person having a real or fancied ground for action against the seller of such medicines, could reach a man with an establishment which was properly licensed, he might, and probably would, find it impossible to reach a person without such establishment.

Some means should be devised by which the public could be protected in such cases.

To allow persons who may be entirely unqualified and who may never be seen again after selling the medicine, to sell drugs for the cure of disease without restriction, while those with permanent establishments are only allowed to sell the same goods when licensed, seems inconsistent.

E. C. M.

GEORGE FREDERIC HOLMES MARKOE.

Professor Markoe was born in Valparaiso, Chili, in 1840. He was a posthumous child and spent the first ten years of his life in Chili with his mother's family. In 1850, his grandfather Markoe of Salem, Massachusetts, desired him brought to that city and the child of ten found many changes, most of them hard to bear, in the transition from the southern to the northern hemisphere. He made for himself, however, a good record at the Phillips Grammar School of Salem, and after his graduation was apprenticed in 1857 to Mr. James Emerton, a Salem pharmacist. Here he followed a course of study outlined by Prof. William Proctor, and upon the Salem Fells began the study of botany, which in later years brought him into close friendship with Prof. Asa Gray of Harvard University.

In 1861 he came to Boston and entered the employ of Mr. Charles T. Carney, whom, ever afterwards, he regarded as "My Master," and for whose ability and integrity he always retained the highest admiration.

In 1863 he entered the store of Joseph T. Brown, one of the principal pharmacists of Boston, and for eleven years was associated with that firm, the last three years as a partner. In 1873 he became proprietor of the store established by them in Roxbury, a part of Boston, in which suburb he resided for seventeen years, during which time he did much active work along chemical lines. He was a pioneer in manufacturing pharmacy, doing much in the making of chemicals and chemical solutions. Here his famous process for the manufacture of phosphoric acid by the action of bromine and nitric acid on phosphorus was evolved. He also did much analytical work and was consulted by many for counsel in practical methods for improvements in chemical processes. He possessed great mechanical ingenuity which served him well when in need of apparatus, of which for years his stock was small.

In 1890 he retired from the retail drug business and devoted himself to work in the Burnett laboratories and to teaching.

His early difficulties in the line of study, led him to sympathize with the apprentice of few opportunities and opened the way to what was undoubtedly the best effort of his life; the establishment of instruction by the Massachusetts College of Pharmacy, which before 1866 was an incorporated body, but not a teaching institution. In 1867 he delivered in a little room on Boylston Street, a series of free lectures on Pharmacy and Chemistry, and from that time, for nearly thirty years, he served as a Professor of his beloved College of Pharmacy, which he was proud and happy to see grow into a strong and influential institution from his small beginning. In 1870 he founded the Alumni Association, and served as its first President. No student ever came under his care who could not at any time command his help and sympathy and in the latter part of his life the recognition of his kindly and helpful assistance by many of these, was to him a source of endless happiness.

From 1873 to 1879, he was Instructor of Materia Medica in the Harvard Medical School. For nearly three decades he served on the Revision Committee of the U. S. Pharmacopœia. He was affiliated in many circles allied to pharmacy; was President of the American Pharmaceutical Association in 1875-76, and was an active member of the Boston Scientific Society, the Horticultural Society, Society of Arts, Massachusetts Pharmaceutical Association, Boston Druggists' Association, a Fellow of the American Association for the Advancement of Science, an honorary member of the British Pharmaceutical Conference and of the Royal Pharmaceutical Society of Brussels. In 1891 Dartmouth College conferred upon him the honorary degree of Master of Arts.

He was twice married. By his first wife, Ellen G. Jenness, he reared one son, George Berger; and by his second wife Louise, granddaughter of Sir Emanuel Moore, he was blessed with one daughter, Llanyd Ellis, the secretary of the large department store of E. A. Filene & Sons, of Boston, Mass.

He passed into the "Great Unknown" in September, 1896, leaving behind him the love and regard of all who knew him best, and who cherished his kindly and genial nature.

Papers Presented to Local Branches

MINERAL WATERS.*

THEIR ORIGIN, INTRODUCTION, ANALYSES AND ARTIFICIAL REPRODUCTION.

JULIUS GREYER.

Water, an inorganic body and a compound of a definite composition, Hydrogen monoxid, is itself a mineral. It is a universal solvent. An absolutely pure water is the product of the laboratory alone. From a strictly scientific standpoint we could consider all waters as mineral waters. The definition as to what should be termed a mineral water will therefore depend largely upon the point of view; that of the chemist differing from that of the physician or that of the layman.

The term mineral water as commonly used has been applied to waters containing an appreciable quantity of minerals. The definition of what constitutes a mineral water, given long ago by Doubeny, perhaps covers the ground as well as any other. He says:—"The term mineral water in its most extended sense, comprises every modification existing in nature of that universally diffused fluid whether considered with reference to its sensible properties or to its action upon life."

From the therapeutic standpoint, a mineral water is any water which may alter in any way the physiologic functioning of the human system, no matter how feebly mineralized the water may be,—or it is any water which, by its inorganic solid or gaseous constituents, exhibits or possesses medicinal virtues.

Although some waters are much lighter in mineral constituents than the ordinary potable waters of most localities, they are yet entitled to a consideration under the appellation "Mineral water," whether its medicinal virtues be due to the presence of some substance effective in small quantities, or its purity and thereby permitting large quantities of fluid to be used.

Wherever we go we find mineral springs, some of which issue quietly and peacefully from the earth, while others are forced to the surface with great violence, either steadily or at intervals, some ascend from the bottom of the sea or lakes or rivers, others appear thousands of feet above the level of the ocean. Some issue from the earth having a temperature near freezing, others near the boiling point, some after reaching the surface of the earth are so heavily laden with matter as to cause crystaline, calcareous and other deposits or precipitations.

The origin and nature of springs depend beyond any doubt upon a leaching process occurring under the influence of atmospheric precipitations, rain water. As water passes through rocks or mineral deposits, it continually leaches out all

* Read before Cincinnati Branch, January 12, 1915.

soluble substances on its way to the interior of the earth, until it reaches the impenetrable layers of clay. Here it meets with other waters which may have traveled great distances through other channels or arteries, having leached other and different strata and consequently dissolved other and different substances. These waters then by hydraulic action or by the pressure of gas as the case may be, are again forced upward, passing through possible new and various strata, and again they may become active, interchanging and possibly again depositing new precipitations of matters which have become insoluble. When finally the water reaches the surface of the earth it either emanates in a quiet peaceful flow or is driven upwards with more or less, and often very great, force. In the formation of mineral waters the vast number of combinations and their operative factors always correspond with the variety in composition of natural mineral waters.

The physiological properties of mineral springs, although replete with wonders to the uneducated, have attracted the attention of scientific men from an early period. Supernatural properties have been ascribed to springs; strange stories propounded regarding their origin and tales and fables were spread regarding their wonderful powers and miraculous effects. Even to this day we find proprietors or owners of springs advertising and claiming supernatural powers and properties for their waters, but, thanks to advanced science, our Government now stops this whenever aware of such tactics.

To illustrate some of the ways of advertising I have a few of the most interesting labels and pamphlets with testimonials.

From a pamphlet of The Kentucky Carlsbad Springs Co., Dry Ridge, Kentucky, we read as follows:—

"The water cure is certainly the most acceptable way to take medicine. Any physician will tell you, after he sees the analysis of the Kentucky Carlsbad Water, that it contains every medicinal quality necessary for the cure of the diseases herein specified. We will take the albumen out of your water in three days. We will give relief of the most severe case of kidney trouble in one day and will absolutely cure any case in ten days. Stomach trouble will be relieved in twelve hours and we will guarantee it to cure any case in the world in ten days, if it has not become cancerous. Bladder trouble of any kind will be cured in ten days. It will cure any old sore by bathing in it two or three days, and if you have any catarrh, heat the water and douche it up the nose on the sore spots and in one week you will have no catarrh. It will cure any sore it comes in contact with and this is the reason it cures stomach and sore kidneys and bladder as it comes in contact with these organs."

The same Company publishes the following testimonial:—

"To whom this may concern:

I will say that I am seventy-six years old, and have had albumen in my urine for five or six years, so much so that a layer would form in the bottom of the chamber in which I urinated, but after a stay of five days at the Kentucky Carlsbad Springs my urine was perfectly clear and no signs of albumen could be seen. At the same time, I had my wife there, who had not walked for four years, and in seven days she was walking. I would sincerely recommend the water as wonderful and beyond what words could express."

I herewith present a label of the Partagas Lithia Spring Water. In the analysis made by C. T. M. Marsh and which is published on the label, no mention is made whatever of any lithia, but this does not prevent this concern to market the water under the name of "Partagas Lithia, The Autocrat of Waters."

Another label of The O. J. Ferris Springs, Plainville, Ohio, reads,—"Crystal Fountain Springs. Purest and best Table Water."

A label of The Isham's Springs of Life Company, San Diego, Calif., reads as follows:—

"Isham's California Waters of Life. The World's Wonder. They possess miraculous power to destroy disease and actually rejuvenate humanity by dissolving and evacuating calcareous old age matter and microbes. The worst forms of costiveness, kidney, stomach, skin troubles, even cancers and gall-stones yield to its marvelous power. Persons troubled with obesity or emaciated victims of excessive use of liquor, tobacco and opium, involuntarily return to a normal, healthy condition and grow strong without a drooping of the spirit. With the new life comes the bright eye, elastic step and a new growth of luxuriant hair."

Another type of existing mineral waters which I have not yet mentioned, are those collected from wells which are dug. To this class belong the various Hungarian Bitter Waters, the Hunyadis, Apenta and others. Hunyadi Janos, for instance, is collected in the Kehlenfeld, consisting of a bed of marl lying in a flat valley between the Adlerberge or mountains. By digging holes, say from 10 to 20 feet deep, the water collects in these wells in a more or less concentrated form, which is dependent upon atmospheric conditions and precipitations. From these wells Hunyadi Janos is pumped into large cisterns and mixed with water from a well yielding a lighter or heavier concentration, until it shows a certain specific gravity, and in this way it is claimed by the proprietors, the Saxlehners, Hunyadi Janos is always of the same composition, a claim which may be characteristically correct, but it is certainly *not* so chemically. So here we are, Hunyadi Janos today is a mixture of about 128 or more wells, owned by the Saxlehners, and among which are those which in former years were marketed by their owners under such names as Hunyadi Arpad, Miclos, Lajos, Lazlo, Joseph, Sandor, etc., etc. They have mostly been acquired since by purchase or otherwise by Saxlehner with the intention of monopolizing the Hungarian Bitter Water Industry.

The success with which a great many mineral water concerns have met and whose waters have become renowned and are marketed all over the world, has been an inducement to many a man owning a spring, the water of which may have exhibited one or another peculiarity, effect or character, to start a spring company, bottle the water and flood the market with their output, advertising matter, testimonials, etc., etc., but the greater majority soon pass into oblivion. You probably remember Ballardvale, Tuckahoe, Navahoe, all lithia waters which have recently died a natural death and upon which large sums of money have been expended. There are thousands more like them.

For a proper and effective introduction of a mineral water it is necessary to ascertain its composition by analysis. This establishes its nature, virtue, character and possible therapeutic value. In fact all mineral waters are to-day introduced by bringing the results of the analysis to the attention of the medical profession. Proper medical application and careful observation afterwards, will then reveal the true medicinal value of same.

What druggist has not met the man who came to him, bottle in hand containing water from the spring of his farm or his ranch? According to his story, he thinks himself in the possession of a veritable fountain of youth, the water having effected some of the most remarkable and miraculous cures and is known to have saved the lives of quite a few who had been afflicted with some incurable disease. If nothing more, it certainly cures kidney and bladder troubles.

Our man, I will call him farmer, like all farmers with a keen eye for money,

already imagines himself the president of a large Spring Water Company; he thinks of the bottling as well as of the advertising of his already renowned water, but more so of the profits which he might be able to make at so much per gallon and costing nothing.

Our farmer having gathered advices from others, is already aware of the fact that to introduce his spring water to physicians, an analysis is of vital importance, then, too, it also impresses the public most favorably and, of course, it is a very able judge of analyses.

The first step has been taken by Mr. Farmer to procure a chemical analysis. The chemist, in many instances of doubtful ability, for the sum of $10 or $20, furnishes the required article, and this is to some extent an explanation why we come across analyses of waters which are absolutely unreliable and some even ridiculous.

In looking up analyses of one and the same water, but made by different chemists, we often notice great differences in their results. One chemist finds a water to contain ten or twelve different salts while the other reports but four or five, yet both chemists may be right, both may have found the same quantities and kinds of acids and bases. The only difference I may say is, that the one chemist has apparently furnished more for the money than the other.

You all know that, in analyzing, we ascertain the kind and quantities of the acids and bases contained in the solution, in our case this being the mineral water in question.

Now then, say both chemists have found the same acids and the same bases in exactly the same quantities, the one may have followed an accepted norm in building up the combinations, while the other combined the acids and bases found, to suit his fancy or in some sort of a haphazard way. By chemists having followed their fancies more than their reasons, the grossest mistakes, yes, absolute impossibilities, regarding the nature of mineral waters have occurred.

It is a difficult matter to compare the work of two chemists and their analyses of one and the same water without laborious re-calculation.

Only of recent years, advanced chemists have adopted a certain norm in combining the results of their analyses of mineral waters, this norm was originated and used by Bunsen, Fresenius and others.

An effort is now being made and conducted jointly by committees of the American Chemical Society, the American Public Health Association and the Association of Official Agricultural Chemists to formulate standard methods for the computations of water analyses.

The statement of an analysis in hypothetical combinations, is evidently a mixture of fact and opinion, ordinary chemical tests reveal but little regarding the chemical composition of mineral waters, therefore the exact amounts of the different salts in solution in a mineral water are largely conjectural; although salts are present, it is a mathematical impossibility to apportion correctly the found quantities of acids to those of the bases, or *vice versa*.

This lack of definite information enables one to follow pretty much his own imagination, and there are many opinions as to how the acids and bases should be combined.

We know that one acid has by far a greater affinity for a certain base than

another. We also know that in the formation of salts, whenever two substances or two solutions of salts are mixed and that whenever such two solutions contain such salts as are liable to form an insoluble compound or a salt which is insoluble, such a salt is formed absolutely.

A solution of Barium Chloride and a solution of Sodium Sulphate when mixed will always form Sodium Chloride, the soluble, and Barium Sulphate, the insoluble salt, and this totally so, if the solutions are mixed in proper molecular proportions.

Knowing this, is it not reasonable, therefore, that as solutions, (mineral waters in this case) contain different acids and bases, that we should assume that the latter are combined in the solution in the ratio of their solubility in water?

A mineral water just emanated, has left all insoluble substances in the ground. In the course of its travel to the surface, it has undergone many changes; it has formed many precipitates and has left them behind. The chalk, gypsum and talcum beds found in nature are the results and the proofs of such ever-occurring precipitations.

Mineral waters, generally, come to the surface of the earth in the form of a clear, brilliant, sometimes bubbling and sparkling and sometimes foul-smelling solution and a "solution" is just what a mineral water is. Now then, is it not reasonable that,—since precipitates or matter which could not be held in solution by the water or which by interchange became insoluble and have been thrown out and left behind,—we assume that those salts least soluble in that solution or mineral water are ready next to also precipitate by the slightest physical change? It certainly is.

This is one of the reasons why Bunsen, Fresenius and other reputable chemists, in considering the results of their analyses, begin with the calculation of the least soluble substances or salts first, advancing to those whose solubility is greater and close with those most freely soluble in water.

In consequence of this the following approximate succession originates: Aluminum, Silica, Barium sulphate, Strontium sulphate, Ferrous carbonate, Manganous carbonate, Calcium sulphate, Calcium carbonate, etc., closing with those whose solubility is very great as, for instance, calcium chloride, sodium bromide, calcium iodide, etc.

Right here I want to mention the name of Dr. F. Raspe, a man who devoted almost a lifetime to the bringing of order out of the chaos of existing analyses of well-known mineral waters from all over the world. Raspe has re-calculated no less than twenty thousand analyses which means that now, these analyses can be compared intelligently, because the differences in the composition of the waters is clearly marked.

Dr. Raspe undertook this enormous task mainly in the interest of the manufacturers of artificial mineral waters.

Like everything else in this world, so has the manufacture of artificial mineral water its history.

Pliny, more than 2000 years ago, observed that "Waters are of practically the same nature as the earth through which they pass."

The first experiments to artificially reproduce a mineral water are said to have been undertaken by Thurneiser in the year 1560. This was before the discovery

of carbonic acid by Van Helmont, 1624, but his results were as poor as those of R. Hoffmann in 1685 and of those of Geoffroy in 1720.

In 1750, Venel, a physician of Montpelier, proposed the dissolving of carbonate of soda in hydrochloric acid and water in a closed bottle and by this method to impregnate the resultant solution of sodium chloride with carbonic acid gas. Finally in 1767, Bewley showed a way to produce carbonic acid gas in a separate apparatus by which he was enabled to impregnate water contained in another vessel with this gas, a method which was soon improved and followed by Priestley, 1772, Lavoisier, 1773, Noll, 1775, Magellan, Corvinus, VanChaulnes and Tobern Bergman, 1777, and others. Bergman, in 1774, had already set up the principle that if to water be added the ingredients found by analysis in proper form and quantities, a water identical with the natural water should result, and it was he, who pointed out the fact that the refreshing taste and exhilarating effects of a sparkling or effervescing water is due to the carbonic acid gas dissolved in it.

After Bergman, the interest in artificial mineral waters became very generally recognized in France, England, Switzerland and Germany.

In 1780, Duchanvy in Paris published the first book on the manufacture of artificial mineral waters.

In 1787, Meyer of Stettin, Germany, manufactured carbonated waters in large quantities.

In 1788, Paul & Gosse in Geneva constructed the first intermittent mineral-water apparatus.

In 1798, the same Paul founded the first mineral-water factory in Paris, and Pierre Fiquir in Marseilles in 1800, and after these followed Schweppe in London, Fries in Regensburg, etc.

Artificial mineral waters in those times were yet imperfect products, because chemical science had not reached its present knowledge and the apparatus were of very primitive construction. These were also the main causes for artificial waters being discredited and the ideas advanced that natural waters were peculiar products and of a nature which could not be artificially reproduced.

Within the past seventy-five years, however, it has been possible to produce artificial mineral waters of absolute perfection. Bergman, Berzelius, Bischof and Struve had pointed out that the composition of natural mineral waters depends upon the amount of carbonic acid and other gases which are dissolved in the water and upon the rocks and strata which they permeate and upon which it acts, and it was Struve who proved this by direct experiment.

Struve selected for his first experiment the acidulous alkaline Joseph Spring of Bilin, Bohemia. He filled a metallic cylinder of about six feet in length with a mixture of powdered quartz sand and klinckstone both of which he took from the ground of the Donnersberg in the immediate neighborhood of Bilin, and subjected this to the action of carbonated water under pressure, he thereby succeeded in producing an artificial water identical in composition with the Joseph Spring.

Struve followed this experiment in a like manner in producing artificial Carlsbad and Friedrichshall, both of which Faraday and Liebig pronounced identical in chemical composition and physiological and therapeutic action with the respective natural waters of these springs.

It is an undeniable fact that the honor to have by his efforts overcome all technical difficulties and to have placed that which had previously been considered unattainable, upon a scientific basis, belongs to Dr. Struve. It was he to whom thanks are due for having produced the first identical reproductions of mineral waters correct in chemical composition, in physical properties and in therapeutic effects and he is therefore deservedly called the father of artificial mineral waters.

Another fact which I want to mention, in connection with the introduction by him of his scientifically prepared mineral waters, is that his efforts accomplished most towards revealing the actual nature of mineral springs and their waters, and that, through his knowledge and scrutiny, many spring and natural mineral waters have greatly profited, inasmuch as their real therapeutic value and their proper application became known among physicians as well as to the public.

Friedrich Adolph Struve, Doctor of Medicine and owner of the Salomonis Apothecary in Dresden, Germany, was born May 9, 1781. After devoting the greater part of his life to his studies in the interests of both the nature of mineral waters and that of the manufacture of artificial mineral waters, he died September 29, 1840.

Struve's first artificial mineral-water institute was opened in Dresden in 1820; this was followed by one in Leipzig, another in 1823 in Berlin, one in Brighton, England, in 1825, and others in Germany, England and Russia, all of which were under his direction and that of his sons. Since then the number of factories increased rapidly, so that in 1877 there had been over 700 of them established in Germany alone.

In America the manufacture of scientifically prepared mineral waters such as are true reproductions of the respective natural springs, is still in a much neglected condition. Very many manufacturers, even at the present time, are using as their unit of measure, in compounding their waters, an ordinary shovel. Others which are more progressive and who at least try to be honest, buy mixtures of so-called mineral water salts, under the various names of springs from manufacturers or supply houses, which, however, at most, furnish but extremely poor results for such salts cannot claim to be anything near to being true representatives of natural springs. It is impossible to compound or to produce true artificial mineral waters from any mixture of water-soluble salts, because such waters contain also substances which are ordinarily insoluble in the form of a salt.

The credit of being the originator of scientifically produced artificial mineral waters in America, belongs to Dr. Carl H. Schultz, who started their manufacture in New York in 1862. Schultz was followed by Dr. Enno Sander of St. Louis and W. T. Wagner's Sons of Cincinnati. These establishments have chemists to compound their waters and have made a name for themselves and their products, and I express the hope that inasmuch as there are very great opportunities outside of New York, St. Louis and Cincinnati, others may soon follow in the uplift of this industry.

It is the duty of a manufacturer of artificial mineral waters to compound his waters in such a manner that when his product is finished, it will conform exactly to the analysis of the respective spring. All and even the minutest quantities of

the various salts shown in the analysis of a water should be taken into consideration by him and should be one of the component parts of his product; nothing should be left out, even if it be considered superfluous or inert.

It is true and it cannot be denied that the salts in a natural mineral water are not always combined exactly in the manner as stated by chemists in their analyses, but this has no bearing whatever on the product of a compounder of an artificial mineral water.

It is entirely immaterial, for instance, whether a chemist or analyst, in his analysis, denotes one molecule sodium sulphate (Na_2SO_4) and two molecules potassium chloride (2KCl), or one molecule potassium sulphate (K_2SO_4), and two molecules sodium chlorid (2NaCL). It is also immaterial whether a solution, or in this case a mineral water, contains these substances as such, meaning as actual salts or as molecular fragments (ions). The artificial product, whether made by dissolving either one molecule sodium sulphate (Na_2SO_4) and two molecules potassium chloride (2KCl), or by dissolving one molecule potassium sulphate (K_2SO_4) and two molecules sodium chloride (NaCl) in water, will contain the same ingredients, the potassium and the sodium as bases and the hydrochloric and sulphuric acid, as acids, in precisely the same quantities and form or forms as in the natural product because they are bound to follow and do follow the same natural laws in one, the natural solution (the mineral water), as in the other, the artificial solution.

Another example:—If we make a solution of proper amounts (the molecular weight) of potassium bromide (K Br) and sodium chloride (NaCl), in distilled water, we will get the same result or exactly the same product as by dissolving (the molecular weight) of sodium bromide (Na Br) and potassium chloride (KCl) in an equal amount of distilled water. Both solutions will have the same action, therapeutically, physically and chemically.

The natural-water men who have been fighting all these years and have tried their best to discredit scientifically-prepared mineral waters, have, to this day, failed to prove the slightest physical, chemical or therapeutical differences between the natural solution of salts, the natural mineral-water, and the scientifically-prepared solution of salts, the artificial mineral-water.

In the manufacture of true artificial mineral waters every ingredient is added to the water in a soluble form, all precipitates which are formed by the mixing of the solutions, are redissolved by and under the presence and pressure of carbonic acid gas.

If the various acids and bases contained in either, the natural and the artificial solutions, agree quantitatively and qualitatively, then as said before Nature will absolutely follow or apply the same law to one as it will and does to the other. Both solutions have been proven to and do act alike physically, therapeutically, chemically and electrochemically; they are absolutely identical in every sense of the word and this in spite of all assertions to the contrary as made by those interested and more especially, financially interested in the natural mineral-water industry.

The following illustration given by Dr. Raspe shows what may, at first sight, appear to be the analyses of three entirely different products or composition, or the analyses of three waters entirely different in composition.

These analyses do not seem to agree in the slightest, yet they have exactly the same value.

	10000 Parts		
	A	B	C
Sodium Chloride	3.297	5.846	.....
Calcium Chloride	2.418	.....	5.546
Sodium Sulphate	1.035	.....	1.775
Calcium Sulphate	0.708	1.700	.....
Sodium Bicarbonate	2.178	.....	5.625
Calcium Bicarbonate	3.310	5.400	.....
	12.946	12.946	12.946

A. Represents an analysis and an application of acids to bases very generally found, in which the chemist has followed no particular norm, but simply his own fancy. With a greater number of elements, the complication would naturally be greatly increased.

B. Represents the same analysis as does A., but in another form, that of the so-called Normal Analysis as adopted by Dr. Raspe and who follows, with but few exceptions, the principles of Bunsen, Fresenius and others.

C. Represents a re-calculation by Raspe in the soluble form, the form which is necessary for the manufacturer of mineral waters.

If you will take the trouble to calculate the quantities of the elements or if you like, the acids and bases contained in either A., B. and C., you will find them to agree perfectly.

It is a fact also that, if you will compound a solution in water so as to contain in 10,000 parts, the amounts of elements, or of acids and bases or their equals in salts, in proper quantities, as given in either A., B. or C., you are bound to get the same results, because the natural laws of changes and interchanges of the ions or molecules in solution will apply themselves to the one solution as to the other. It is experimentally proven as mentioned before, that salt solutions, formed by different salts but corresponding to the same Ionic table, have the same physical properties.

Many controversies have been carried on between those balneologists who speak in favor of natural mineral waters and who claim a superiority for them, and those scientific men who declare themselves in favor of and who prefer and recommend the use of scientifically-prepared artificial mineral waters; especially does this preference apply to the bottled and shipped natural waters as found in the market, which often, are quite aged before they reach the consumer.

It might be interesting to you to listen to the words of a few authoritative men opposing the contentions of those who, in their arguments against artificial mineral waters, claim that man cannot produce anything new in nature by artificial means nor produce artificially such a thing as an artificial mineral water. In doing this I wish to call your attention to the fact that the opponents of artificial waters lay special stress upon the unknown substances and the hidden powers contained in natural waters and which they say chemists to this date have not been able to detect.

Dr. Wachter (Heidelberg) says:—"Does not man by use of reason and choice selection breed animals, does he not bring thousands of plants in close contact with each other for the production of a new heretofore unknown species? Yet no

one will assert that he is the real creator of the newly-acquired result of the cross-breed. . . . . As every one may know, fluid water is composed of two gaseous elements, oxygen and hydrogen, a mixture of which gases can be brought to unite by but a weak electrical discharge into a fluid form,—into water. Now, no one will assert that this water, seemingly produced by man (the artificial), is different from the atmospheric or terrestial (the natural water). No one will doubt that it is water at all because the coarsest reasonable conception will enable one to identify it as such."

Dr. Max Roloff of the University in Halle says:

"Wherever physical chemistry has been treated with knowledge and logics and has not been pressed into the service of water-advertisements (Brunnenreklame), there is not the slightest point to show a principle of physical or chemical difference between artificial and natural waters. . . . . Has not the surrogate manufacturer just the same right to assert that his product surpasses the natural spring because it does not contain those harmful mysterious impurities? Further, I have never found that a spring was recommended because of the curative power of the unknown ingredients, the therapeutic effects were always founded upon the known and, in proven quantities, present salts and because of these quantities compared with similar springs. The balneologists then, do not themselves believe in the action of these mysterious matters, these only serve as an argument in fighting competition."

Prof. Carl Ernst Bock, of Leipzig, in speaking of artificial mineral water, says:—"Artificial mineral waters take the place of the natural mineral waters in every respect, although many physicians are prejudiced against the former."

Dr. W. Jaworski, Prof. int. med., University, Krakau, says:—"The scientific investigation so far has not been able to prove any specific properties in mineral waters which were not also possessed by the artificial solutions. Both salt solutions follow the same natural laws. The contrary assertions are spread for reasons of personal interests. . . . There is no proven difference to be found in the action of the artificial salt solutions and the mineral waters upon the system. The experimental investigations have not been able to prove a difference, but on the contrary, they have proven the identity in action of the natural and artificial salt solutions. . . . The natural mineral waters are crude products (*Medicamenta cruda*) of accidental composition, which, in modern therapeutics, may be placed among the many obsolete products of nature."

In conclusion, I, herewith, give another quotation from Dr. Wachter. . . . "The manufacturer has done his duty as soon as he proves that his artificial water agrees with the natural water in every way in chemical and physiological respects, and it is, as soon as he has fulfilled these conditions, a deep re-acting wrong, if physicians and laymen assert that a proven difference exists between the spring waters and that produced in the laboratory, while they are at the most entitled to say:—'It is possible that a difference exists, but that it is not detectable with our present analytical means,' and never was a physician in the position to maintain of an artificial water which fulfilled the requirements of a chemical analysis, that the artificially produced water has a different action upon the system than the natural, but you always hear them say, 'I take it for granted that they act different because they are not natural." . . .

RESTRICTIONS IN THE DISTRIBUTION OF POISONS.*

CARL T. BUEHLER, PH. G.

There has been so much written and said about restrictions in the distribution of poisons, and yet, we seem to be at the starting-point. I think it is the duty of every pharmacist to take an active part in the operation of our pharmacy laws, and if they are not satisfactory, then we should decide what we want and all put our shoulders to the wheel and work until we get a pharmacy law that is of mutual benefit to the pharmacist and to the public.

The following paper contains only an individual opinion regarding the poison law, but I will be pleased to hear remarks and suggestions.

I am in favor of two schedules:—Schedule A. and schedule B. Schedule A. to contain a list of habit-forming drugs and abortifacients, their sale to be restricted to physicians' prescriptions only, and in no case should these prescriptions be re-filled without an order from the physician.

The physician should not be allowed to dispense in his office or elsewhere, any drug, chemical or preparation enumerated in Schedule A., but in all cases he should be required to write a prescription for them; this prescription to be filled by a licensed pharmacist.

To prohibit the pharmacist from the sale of habit-forming and abortifacient drugs, and to permit the physician to dispense them, does not put a stop to the evil. There is no more justice in this, than there would be for a mother who has two sons, to teach one that it is wrong to dance, and to make a dancing-teacher of the other. This would not stop dancing. Neither will the illegitimate sale of habit-forming and abortifacient drugs be stopped as long as a tight rein is held on one person and a loose rein on the other. A "dope fiend," as he is called may go to a drug-store to get some "dope," and be refused; then he goes to a dispensing physician who accommodates him. Who does the public blame for this sale? I will leave this question for you to answer.

Any physician doing business as a pharmacist, should not be permitted to fill the prescription he writes for a drug, chemical, or preparation enumerated in Schedule A., but at all times some other licensed pharmacist should do the compounding and dispensing.

Schedule A.:—Hydrocyanic Acid, Opium, and all preparations of opium containing more than two grains to the ounce; Morphine, all salts of morphine and all preparations of morphine, containing more than one-third grain to the ounce, with the exception of Dover's Powder; Cocaine, all salts of cocaine and all preparations of cocaine; Codeine, all salts of codeine and all preparations of codeine containing more than one-half grain to the ounce; Chloral Hydrate, all preparations of chloral hydrate; Heroin, all salts of heroin and all preparations of heroin; Beta-Eucaine, Beta-Eucaine Lactate; Ergot, Veratrum, Cotton-Root, Savin and all its preparations.

Nothing in Schedule A. should interfere in the treatment of emergency cases

* Read before St. Louis Branch, November.

by physicians or the selling of any drugs, chemicals, or preparation by a pharmacist to physicians, or the sale among manufacturers, wholesale druggists and pharmacists, or the sale of hypodermic tablets to dentists, graduate nurses or nurses in training.

Schedule B. to contain a list of poisons not enumerated in Schedule A.

Schedule B.:—Aconite, Belladonna, Colchicum, Conium, Nux Vomica, Cantharides, Digitalis, Henbane, Cannabis Indica, Stramonium, Gelsemium, and their pharmaceutical preparations. Arsenic and its preparations. Mercury and its salts with the exception of Calomel. Zinc Sulphate, Cyanide of Potash, Oil of Bitter Almond, Croton Oil, Chloroform, Ether, Carbolic Acid, Oxalic Acid, Strychnine and its salts, Elixir Iron, Quinine and Strychnine, Potassium Hydroxide, Sodium Hydroxide, Paris Green, Spirit of Nitroglycerin, Wood Alcohol, Denatured Alcohol, Mineral Acids, Iodine and its preparations, Lead Acetate, Potassium Permanganate, Cresol and all preparations of Cresol, Silver Nitrate, Tartar Emetic, Oil Mustard, Bromine, Formaldehyde Solution more than two *per cent.* in strength.

All drugs enumerated in Schedule B. must be recorded in a poison register similar to our present Missouri law requirements for Schedule A. An entry should be made, stating the date and time of sale, name and address of purchaser, male or female, name and quantity of poison sold, the purpose for which it is supposed to be used and the name of the dispenser. The container should be labeled with the name of the article, the word "Poison," and the name and address of business of the seller. Such book should always be open for inspection to proper authorities, and the register to be preserved for at least five years after it has been filled. Nothing in this schedule should apply to the dispensing of poisons in not unusual quantities or doses, by the pharmacist upon the prescription of a physician or upon the prescription of a dentist for mouth washes. Nothing in this schedule should be so construed as to interfere in the sale among manufacturers, wholesale druggists, pharmacists, physicians and dentists.

Should the physician be allowed to dispense articles enumerated in Schedule B., provided he keeps a record similar to that of the pharmacist? Or, should be be allowed to dispense these poisons as he is doing to-day, without keeping a record and without labeling the container, stating the name of the poison or directions for its use?

In my opinion, as long as physicians are permitted to dispense, a practicing physician should be permitted to dispense to his patients any article enumerated in Schedule B., either alone or in a compound, by first making an entry in a book kept for that purpose, stating the date, name and address of the patient, name of poison, alone or in compound, quantity dispensed, quantity in each dose, number of doses. The container should contain the name of patient, directions how to be used, name and address of physician.

Schedules A. and B. have reference to original and broken packages, sealed and unsealed packages.

Section on Practical Pharmacy and Dispensing

Papers Presented at the Sixty-Second Annual Convention

SHOULD THE RETAIL DRUGGIST MANUFACTURE HIS OWN PREPARATIONS, OR BUY THEM?

CHARLES J. CLAYTON.

This is a problem that can be solved in almost as many ways as there are retail druggists, for the answer depends upon the conditions surrounding each one, who must decide for himself, according to those conditions.

To the true pharmacist, the making (the creating) of his own preparations is the breath of life, and he will, if necessary, sacrifice both time and profit to the gratification of his desire in this direction.

However, in this day and age, true pharmacy, unmixed with commercialism, is hard to find, and commercialism decrees that our preparations shall be produced at the lowest cost commensurate with first quality, and it may, and often does happen, that some one else can be employed to do many things for us more cheaply than we can do them ourselves. If then, we are justified in employing some one to do these things for us in our stores, where the facilities for good work are often lacking, may we not be equally justified in going a step farther by the employment of coöperative manufacturing enterprises, or the purchase of our preparations from some reliable manufacturing house? Surely, there would be nothing unethical in this, and it may well be that in many instances, by reason of the facilities that these houses have for securing the best qualities of crude drugs and for assaying the finished preparations, the latter would more nearly conform to the standards set by the authorities. Then, too, it has been my experience that a large proportion of drug clerks,—even though they may be registered and graduates in pharmacy,—to whom the manufacturing work in the store falls, are either incompetent or careless of results

So, in order to be sure of good results, the employer must, in many instances, either do the work himself or exercise a close supervision over those who do.

Even in the case of such preparations as are almost universally made in the stores where they are sold, we are reminded occasionally of the need of supervision, the following instance occurring to me recently:—During the temporary absence of my clerk, a relief man was employed, one who was registered, and who had conducted a store of his own for a number of years. He called my attention one morning to the fact that he had started to make some solution of Magnesium Citrate, saying that he did not know whether he was making it according to my way or not. On being asked if he had followed the U. S. P. formula, he said he didn't know; he had put in two ounces of magnesium carbonate and four ounces

of citric acid for six bottles. His attention was called to the fact that considerable more of these articles were needed to make it right, and he was asked if he had added the syrup and flavor, to which he replied, "No, what flavor do you use, Vanilla"?

He stated that he had found his formula in the last store that he had owned, and had been using it ever since, without a thought as to whether it conformed to the standards or not.

I have seen a percolation-process performed by pouring a menstruum repeatedly through a loosely-packed or entirely unpacked drug, and I have seen a finely-ground drug packed so firmly that percolation would involve a matter of weeks, while the percolator was left uncovered for the admission of dirt and to allow the loss of alcohol by evaporation.

Of course, these are extreme instances, and I do not, because of them, advocate buying everything. On the contrary, I advocate making everything that we can ourselves, and for my own part, I buy very few preparations. Neither do I mean to reflect too severely upon the ability of the clerks, who, in the average store, are chosen more for their ability as salesmen than for any other reason, and it is unfair to expect that they shall have all the desirable attributes in addition thereto. Moreover, the employers are not materially their superiors in these matters.

Then, too, no matter how competent we or our assistants may be, there are some things that it seems to me, we cannot afford to make ourselves, because of the time involved in their preparation. I would cite Seidlitz Powders as an example. The cost of the materials for a gross of these is something over $1.20 while they can be bought, guaranteed U. S. P., for $1.40.

I believe that a pharmacist's time is worth too much to spend it in weighing, mixing, dividing and folding 288 powders for a saving of less than twenty cents, even though he may have nothing better to occupy his attention than the perusal of the pharmaceutical journals. However, having bought your seidlitz powders, a very decided saving can be made by packing them yourself, a small investment in envelopes, cartons, boxes and labels, sufficing to take the place of a large stock of finished packages. Another item upon which no material saving is made, is in the filling of capsules of quinine, the difference on the two-grain size amounting to only about fifteen cents per thousand. Of course, if one has a boy who must be kept busy in order to keep him out of mischief, it may pay to do even such things as these, rather than to depend upon the manufacturer.

To sum up, there are the following arguments in favor of purchasing many preparations:—First, a saving of time, which if considered at its true value, would frequently mean a saving in cost as well; second, an assurance of a preparation skilfully prepared, and conforming to the required standard.

At this point, however, I would call attention to the necessity of specifying exactly the preparations desired and a careful inspection of the labels; for the most dependable manufacturers have their favorite formulæ for many preparations, claimed by them to be superior to their official counterparts, and these special preparations are likely to be sent unless careful specification be made. These may be, as claimed, superior to the U. S. P. and N. F. products, but where there are two or more formulas for an article bearing but one name, and when these

differ materially in their content of a potent drug, there arises the danger of overdosage, due to the patient becoming accustomed to a weak preparation, and later being furnished with a stronger one, and not knowing of the change, continuing the same dosage. Even if no actual danger were the result of this, the different strengths of the various preparations dispensed under the same name, results in uncertainty of effects, and a consequent loss of faith by the prescriber in the efficacy of drugs, and may be a leading reason for the abandonment of their use.

In favor of making our own preparations it may be said:—first, in most instances there is a material saving in the cost; second, preparations can be made in such quantities as are justified by the demand, so that they are less likely to become deteriorated by reason of age; third, if U. S. P. and N. F. formulæ are followed, the lack of uniformity due to varying private formulæ, however good the latter may be, is obviated, and identical preparations will be dispensed everywhere; fourth, this is a part of true pharmacy, which no man who loves his profession would willingly abandon.

No doubt other reasons, both *pro* and *con*, will occur to the minds of my auditors, but I have said enough to show that there are two sides to this, as there are to most questions.

SOME PHARMACEUTICAL NOTES.

WILLIAM R. WHITE, PH. C.

Oleate of Mercury, U. S. P.:—This when kept in glass ointment jars for a month or more, will discolor on the top. By covering the surface of the oleate with distilled water and adding hot paraffine until a thin layer is formed when cold, the oleate can be kept for a long time without change.

Spirit Etheris Nitrosi:—Practically, all of the Spirit of Nitre dispensed by pharmacists, is made by diluting one pound of the concentrated spirit with twenty-one pounds of cooled alcohol. This concentrated spirit is very volatile and boils at about 63° F., and unless manipulated very carefully some of it will be lost by evaporation. This loss can easily be avoided by cooling both alcohol and concentrated spirit, inserting a champagne tap in the cork of the nitre bottle, attaching a glass tube to it by means of a small piece rubber tubing and, after inserting the glass tube in the alcohol, opening the cock of the champagne tap and inverting the nitre bottle. If a hole is made in the stopper of the alcohol bottle and the glass tube snugly fitted into it there will be no loss. The writer believes that faulty manipulation is the cause of so many samples of Spirit of Nitre being reported below standard by the inspectors.

Fowler's Solution —This preparation is made by boiling arsenic trioxide and potassium bicarbonate in a concentrated aqueous solution until the arsenic is dissolved, adding the remainder of the water and the color.

The U. S. P. says that when pot. bicarb. is heated to this temperature, it is converted into the carbonate which is more alkaline than the bicarbonate and consequently it dissolves the arsenic more readily. This being true, why not use the carbonate in proper amount instead of the bicarbonate?

In making syrup without heat, if the water is added to the sugar, lumps form which are hard to break up; if the sugar is added to the water with continuous stirring, after a part of the sugar has been added, the solution becomes somewhat viscid and the last of the sugar will ball up and float and it requires a great deal of stirring to dissolve it, but it has been observed that if all of the sugar (free from lumps) is poured into the water without stirring, the greater part will be dissolved and no lumps will be found either on the top or bottom, and that the excess on the bottom can be easily dissolved by stirring a short time. Much time and labor is saved by this method, where large quantities are made.

In very hot weather, such as is often experienced in the South, it is impossible to dispense Zinc Oxide Ointment and Belladonna Ointment when made according to the U. S. P. formulæ in a solid state. The U. S. P. should permit the addition of from 5 to 10 *per cent.* of white wax in the summer time.

A sample of citric acid was purchased which formed a yellow solution when dissolved. Analysis showed a large amount of iron present.

Below are given two incompatible prescriptions with criticisms:—

℞ Strontium Bromide..... 4 drams
Mixt. Rhubarb and Soda, q. s. ad..... 3 ounces
Misc.

When the strontium bromide was added a strong effervescence occurred and carbon dioxide was given off freely. This was caused by a reaction between the strontium bromide and the sodium bicarbonate in the Mixture of Rhubarb and Soda which formed sodium bromide, carbon dioxide and water and precipitating strontium carbonate, according to the following equation:—

$$SrBr_2 + 2NaHCo_3 = SrCO_3 + 2NaBr + H_2O + CO_2$$

The gas was allowed to escape before bottling and a shake-label attached.

℞ Tr. Ferri Mur..... 1 ounce
Dil. Phosphoric Acid..... 1½ ounces
Syr. Hyphophosphites (Churchills), q. s..... 1 pint

However mixed there was produced a heavy gelatinous white precipitate of Ferric Hypophosphite with perhaps some calcium phosphate. By using the Tinct. Citro-Chloride of Iron a precipitate is avoided and a yellowish transparent solution is produced.

When sifting tartaric acid or beta-naphthol, great annoyance is often experienced by the powders irritating the skin. By applying talcum powder freely to the face and hands the trouble may be avoided.

Tinct. Iodine applied to a silver nitrate stain on the skin, followed by an application of ammonia water, will change the stain from black to white and it will be removed.

Peroxide of Hydrogen, applied to a stain of ferrous iodide on the skin, will liberate the iodine, making a red stain, a mixture of dilute acetic acid and sodium hyposulphite will instantly remove this.

DIFFICULT PRESCRIPTIONS.

J. LEON LASCOFF, PHAR. D.

I.

℞ Chloretone ..... 1 gr.
Homatropin hydrochloride..... 1 gr.
Aq. Camphoræ..... 2 dr.

A precipitate was formed which dissolved on warming and later re-precipitated on cooling. We used distilled water, instead of the camphor water, and a clear solution was obtained. After exposing the first mixture in an open vessel for a time, the solution became clear, showing that the precipitation was due to excess of camphor. The liquid being already saturated with the latter cannot dissolve any other salt which is soluble only in this proportion (Chloretone is soluble—1 in 100). This can also be applied to other *saturated* solutions in which no other salt can be dissolved.

II.

℞ Sod. Bromide ..... 15.0 gr.
Antipyrin ..... 2.0 gr.
Glycerin ..... 30.0 cc.
Aqua, q. s. ad..... 120.0 cc.

This prescription has very often a green color. This is due to traces of nitrous acid present in glycerin, which reacts with the antipyrin and gives the green color. By the use of Glycerin C. P. a colorless mixture is formed.

III.

℞ Potass Citrate ..... 2 dr.
Syr. Ipecac ..... ½ dr.
Syr. Pruni Virginiana..... 1 oz.
Aqua, q. s. ad..... 3 oz.

This prescription was sent to us for experiment. We find that the potassium citrate neutralizes the acetic acid, which is added in preparing the syrup of ipecac, to hold in solution the constituents of ipecac, as emetine and others. As the acid is neutralized, the constituents are precipitated. To prevent this, add to the syrup of ipecac, a few drops of acetic acid before mixing. In this case you will get a clear mixture.

IV.

℞ Calamini 4.0
Zinci Oxidi 6.0
Glycerini 30.0
Olei Amygdalum dulcis..... 30.0
Aq. Calcis, q. s. ad..... 120.0

If this prescription is compounded in the order it is written, the oil separates, and no amount of shaking will cause it to mix. To have this prescription properly made, mix the oil with an equal amount of lime water, and shake until an emulsion is formed. Then add a few drops of Fl. Ext. Quillaja and gradually add the remainder of the lime water and the glycerin. Mix the powders in a mortar, and rub up with the mixture. This will form a nice uniform lotion. Even after standing a few days, the powder was still in suspension.

V.

℞	Deutoiodureti hydrargyri	0.2
	Potassii iodid	30.0
	Tincturae Iodi	0.4
	Syrupi Ferri Iodidi	45.0
	Aqua q. s.	120.0

This prescription which is red on first mixing becomes decolorized on standing. The diluted hypophosphorous acid of the syrupus ferri iodidi reacts with the free iodine of the tincture, forming hydriodic acid which is colorless. To have the free iodine which is wanted present in this prescription, therefore the syrup ferrous iodide (1890) which does not contain hyphosphorous acid, should be used. This forms a clear, red mixture, which remains so on standing.

N. B.—The physician informed the patient not to accept the prescription unless it was of red color.

VI.

℞	Liq. Potass Arsenitis	2 dr.
	Syr. Ferr. Iodidi, q. s.	2 oz.

Liq. Potass Arsenitis contains potass. carbonate. The potassium bicarbonate on boiling being converted into carbonate. This,—if the syrup does not contain diluted hypophosphorous acid, as the syrup of U. S. P. 1890,—will react with the ferrous iodide, forming a precipitate of ferrous carbonate, which is converted into ferric hydroxide. To prevent this precipitation, use a syrup containing accurate amount of diluted hypophosphorous acid, or neutralize the Fowler's Solution with diluted hypophosphorous acid before mixing, and you get a perfectly clear mixture.

VII.

℞	Olei Cadini	20.0 cc.
	Aqua. Destil, q. s. ad	120.0 cc.

Oleum Cadinii could not be emulsified by the ordinary emulsifying agents, neither could a suspension of the oil in water be obtained. The best way to prepare this is to emulsify the oil with the yolk of an egg, then adding a few drops of Fl. Ext. Quillaja (Soap Bark). This helps saponification.

RED GUM.

JOHN K. THUM.

Eucalyptus rostrata, sometimes referred to as Australian Kino, and more popularly known by the name "Red Gum," is to be found on the market, pharmaceutically, in the form of troches and in a fluid form, misleadingly termed by the manufacturers, a fluidextract.

Like Kino, U. S. P., it contains considerable tannin which makes it extremely valuable as an astringent. The so-called fluidextract has obtained some vogue among throat specialists as a local application in place of the well-known Glyceri-

tum Tannin, it being much more agreeable and pleasant to the patient, and is just as efficient as the latter preparation.

While all the manufacturers who market a fluid form of red gum have it listed in their price lists as a fluidextract, some have an asterisk placed beside the word and, on referring to the footnote, one finds these words:—"those fluids which do not represent the crude drug, minim for grain"; which is a tacit confession that it is impossible to make a hundred *per cent.* solution of this drug.

From a study of the literature relating to this drug,—and this literature, by the way, is scant,—one is informed that it is soluble in cold water to the extent of 80 to 90 *per cent.* This is wrong. It is extremely doubtful if as much as 30 *per cent.* is soluble iu cold or even in boiling water. My experience leads me to believe that less than 20 *per cent.* of the drug is soluble in boiling water, and that it refuses to remain in solution without the addition of varying amounts of glycerine; without this addition gelatinization always results. My experience also showed that the use of alcohol in effecting solution is unnecessary or is at least less effective than a menstruum consisting of water and glycerin. Heat must be used. I found that after shaking twenty parts of the powdered drug with eighty parts of cold water, at intervals, for twelve hours, two parts of drug remained in solution. By heating in a flask on a water bath for fifteen minutes and frequently shaking, about 10 *per cent.* is dissolved. Unfortunately after a few days a jelly-like mass resulted. This, however, as mentioned above, can readily be overcome, or rather avoided, by the addition of glycerin, or better still, by heating on a water-bath with equal parts of glycerin and water.

After more or less experimentation, which I need not recount here, I evolved the following formula and method of procedure which seems to meet all the requirements of those physicians who wish to use Red Gum as a local application:—

Red Gum, powdered	200 gm.
Glycerin	250 cc.
Water, a sufficient quantity to make	1000 cc.

Mix the glycerin with five hundred cubic centimeters of water, and triturate the powdered red gum with sufficient of the mixture to produce a smooth paste. Transfer this to a flask by the aid of the remainder of the mixture of glycerin and water and heat on a water-bath for one hour; filter through purified cotton, keeping the funnel well covered. Finally, pass sufficient water through the filter to obtain one thousand cubic centimeters of fluid.

TURKISH SUPPLY OF GUM TRAGACANTH.

Owing to the scarcity of labor due to military levies the gathering of most of this year's yield of Asia Minor gum tragacanth was prevented. The local stock remaining from last year does not exceed 30 tons. There has been little demand this year from European buyers, but some small shipments have been made to the United States. Prices are abnormally low, but increased freight rates bring them to almost the usual level. Good natural gum sells for 38 cents per pound c. i. f. New York. The white variety is slightly dearer.—*Consular Report.*

Section on Pharmacopœias and Formularies

Papers Presented at the Sixty-Second Annual Convention

PHARMACOPOEIAS AND FORMULARIES OF THE WORLD.

R. H. NEEDHAM.

Mr. Otto Raubenheimer offered an exhibit of Formularies, principally German ones, at the last meeting of the Section on Pharmacopœias and Formularies, in Nashville. At the same time he delivered a very interesting lecture on the different works, taking up each one in detail. The effort of Mr. Raubenheimer to acquaint the Section with the Pharmacopœias and Formularies of the Continent, led the President, I presume, to assign to me the task of compiling a list of the publications. While I welcomed the assignment and made preparations to present a more complete list, circumstances, over which I had no control, have prevented me from completing the list as I had planned.

To increase the interest in this paper I will make explanations concerning several publications.

I have not included in my list a large number of formularies and receipt books in the United States, confining my attention to the recognized authorities of other countries.

Great Britain has a long list of so-called pharmacopœias, which are in reality formularies, almost every hospital or infirmary having its own formulary. "Squire's Companion to the British Pharmacopœia" and his "Pharmacopœias of the London Hospitals," (published by J. & A. Churchill, London, edited by P. W. Squires) have been standard works of reference in London and England for over forty years. The former is the classic commentary of British Pharmacopœias, originally issued after the first British Pharmacopœia appeared, has kept pace with both medical and pharmaceutical science. The latter has been in existence over a quarter of a century, devoted not only to giving information concerning pharmaceutical processes, but has been a repository of everything worth while, regarding new remedies. "Martindale's Extra Pharmacopœia" is edited by Dr. W. H. Martindale and Dr. W. Wynne Wescott, published by H. K. Lewis, London. The latest edition appears in two volumes, the second part being devoted mainly to analysis, organotherapy, bacteriology and physiologic chemistry. The British Pharmaceutical Codex is published by the Pharmaceutical Society of Great Britain, with a view of providing formulæ for mixtures, etc., in imitation of the popular specialties issued by the drug houses and to combat the increasing tendency of giving trademark names to synthetic chemicals. The Pharmaceutical Formulas and Provincial Hospital Formulas are issued by

the publishers of the Chemist and Druggist. The Pharmaceutical Formulas devotes itself to the practical work of the drug store, almost entirely, though its information is encyclopedic in character and therefore very valuable to the practising pharmacist. Canada, in addition to the British Pharmacopœia and the Canadian Formulary, uses the United States Pharmacopœia, National Formulary and the Dispensatories.

"The Taxa" of Russia is an authorized official list of the prices that a pharmacist may charge for drugs, chemicals and pharmaceuticals in various quantities. In addition to the Russian Pharmacopœia there are a number of Formulæ published as an appendix to the official "Taxa." Two German Formularies, translated, are in common use.

Cuba, in addition to the Spanish Pharmacopœia, uses French works, translated. Mexico also uses several translated French texts in addition to the Dispensatory.

I desire to express my appreciation for services rendered me in compiling this list. Assistance was given by Mr. Otto Raubenheimer, Burroughs Wellcome & Co., London, the managers of Parke, Davis & Co. in London and St. Petersburg, and several others.

LIST OF PHARMACOPOEIAS AND FORMULARIES.

UNITED STATES.

United States Pharmacopœia.
National Formulary.

GREAT BRITAIN.

British Pharmacopœia.
Martindale's Extra Pharmacopœia, 1912.
Dublin Pharmacopœia.
British Homoepathic Pharmacopœia.
Squire's Companion to the British Pharmacopœia.
British Pharmaceutical Codex, 1911.
British Dental Pharmacopœia.
Provincal Hospitals' Pharmacopœia (Formularies):
- Bradford Infirmary.
- British Hospital for Diseases of Skin.
- Charing Cross Hospital.
- City of London Hospital for Diseases of the Chest.
- Evelina Hospital for Sick Children.
- Hospital for Consumption and Diseases of the Chest, London.
- Hospital for Diseases of the Throat, London.
- London Hospital.
- Manchester Royal Infirmary.
- Middlesex Hospital, London.
- Royal Hospital and Infirmary, Edinburgh.
- Royal Naval Hospital, Haslar.
- Saint Bartholomew's Hospital, London.
- Saint George's Hospital, London.
- Saint Thomas' Hospital, London.
- Sheffield Union.
- Pharmacopœia, Guy's Hospital, London.
- University College Hospital.
- Universal Pharmacopœia.
- Squire's Pharmacopœias of London Hospitals.

Royal College Physicians of London.
Mericat—Chirurgical Pharmacopœia.
Prescriber's Pharmacopœia.

FORMULARIES (Proper)

Pharmaceutical Formulas, 9th Edition.
Pocket Formulary, (H. Beasley.)
Bournemouth Formulary, (Bournemouth Pharmaceutical Association.)
Pharmaceutical Formulary, 1904, (J. O. Braithwaite.)
Unofficial Formulary, (British Pharmaceutical Conference.)
Formulary, (Central London Throat, Nose and Ear Hospital.)
Glasgow and West of Scotland Formulary. (Glasgow and West of Scotland Chemists Association.)
Universal Formulary, (R. E. Griffith.)
Compendium of Pharmacy and Druggists Formulary, (W. B. Kilner.)
Tables of Materia Medica with Formulæ, (J. Kirby.)
Practical Hints and Formulas, (B. Lillard.)
Pharmaceutical Formulas, 1911, (Peter MacEwan.)
Formulary for New Remedies, (F. Magendie.)
Manual of Formulæ.
Druggist's Handbook of Formulas, (J. H. Nelson.)
Introduction to Pharmacy with Formulas, (E. Parrish.)
Pharmaceutical Journal Formulary (Pharmaceutical Society of Great Britain.)
Gray's Supplement, (T. Redwood.)

INDIA.

The Prescribers Pharmacopœia, (Kemp & Company, Bombay.)

CANADA.

The Canadian Formulary, (Toronto.)

FRANCE.

Codex Medicamentarius, Pharmacopie Francaise, 1908 Ph. Fr. V.
Formulaire (H. Bocquillon-Lumousin.)
Nouveau Formulaire Magistral, A. Bouchardt.)
L'Officine, Conspectus des Formularies, 1911, (F. L. M. Dorvault.)
Formulaire, (Dujardin-Beaumentz & P. Yvon.)
Nouveau Formulaire pratique des Hospitaux, (H. M. Edwards and P. Vavasseur.)
Formulaire des Medecins Practiciens, (F. Foy.)
Formulaire, International, (J. Jeannel.)
Pharmacopie Universelle, (A. J. L. Jourdan.)
Formulaire des Maladies des voies Urinaires, (F. Mallez.)
Formulaire des hopitaux civils de Paris, (F. S. Ratier.)
Formulaire raisounes des Medicaments, (O. Reveil.)
Formulaire des Specialites Pharmaceutiques, (Gorditti, Paris.)
Formulaire Magistral de Therapeutigue Clinique et de Pharmacologie, (Martin, Paris.)
Formulaire des Pharmaciens Francasi, 1911, (F. P. F., Orleans.)

GERMANY.

Deutsches Arzneibuch, 5 Ausgabe, 1910. Ph. Germ. V.
Hager's Handbuch der Pharmazeutiscen Praxis, two volumes and supplement, Berlin, 1908.
Neues Pharmazeutisches Mannual, Eugen Dieterich, by Karl Dieterich, Berlin, 1913.
Erganzungsbuch zum Arzneibuch fur das Deutsche Reich, Driette Augsgabe, published by Deutscher Apotheker Verein.
Verschriften fur Entfernung von Flecken, (S. Andresen.)
Vorschriften zur Selbstbereitung Pharmazeutischer Spezialitaten, published by Deutscher Apotheker Verein.
Formulæ Magistrales Germanicæ, (F. M. G.) by Dr. L. Lewin.
Meyer's Muster-Rezepte, (Gustav Meyer, Berlin, 1910.)
Formulæ Magistrale Berolinenses, (Berlin Formulary of F. M. B.)
Dresdener Vorchriften, published by Verein der Apotheker Dresden's und der Umgegend, (Dresden Formulary.)
Vorschriften zur Gleishheitlichen Herstellung Pharmazeutischer Zubereitungen by Dr. Carl Bedall, (Munich Formulary.)
Hamburger Vorschrfiten Sonderabdruck aus der Apotheker-Zeitung, (Hamburg Formulary.)
Dr. Unna's Magistral Formeln, Sonderabdruck aus der Pharmazeutischen Zeitung.
Beiersdorf's Handbuch, P. Beiersdorf & Co., Hamburg.
Vierteljahresschrift fur Praktische Pharmazie, (H. Salzman und W. W. Wobbe, Berlin.)
Manule Pharmaceuticism, (H. Hager.)
Pharmaceutisch-technisches, (H. Hager.)
Pharmaceutisch-technisches, (Hanover Formulary.)
Pharmaceutisch-technisches, (Bavarian Formulary.)
Formular Pharmazeutischer Spezialitaten heransgegeben von Luxemburger Apotheker Verein, (Luxemburg Formulary.)

BELGIUM.

Pharmacopœia Belgica Editis Tertia, 1906.
Formuaries:—
Formulaire de Preparations Pharmaceutiques Adopte para Societ de Pharmacis D' Anvers, (Antwerp Formulary.)

ARGENTINA.

Farmacopea Nacional Argentina, Primera Edicion, 1898, Ph. Arg., 1.

CHILI.

Farmacopea Chilena, 1886, Ph. Chil., 1.

DENMARK.

Pharmacopea Danica, 1907, Ph. Dan., VII.

GREECE.

Pharmacopœa Helvetica, editio Quarta, 1907, Ph. Helv., IV.

SPAIN.

Farmacopea Oficial Espanola, Septima Edicion, 1905, Ph. Hisp., VII.

AUSTRIA.

Pharmacopœa Austriaca Editio Octavo, 1906, Ph. Austr., VIII.
Formularies:—
Hell's Manuale, 2 Vols., (Gustav Hell Troppen.)
Praeparata Pharmaceutica, Vienna, 1903, (S. Rektorik.)

ITALY.

Farmacopea uffciale del regno dItalia, Terza edizione, 1909.
Medicamenta, 1908, (Migliaia, Milano.)

HUNGARY.

Pharmacopœa Hungarica, editio tertia, 1909, Ph. Hung., III.

JAPAN.

The Pharmacopœia of Japan, 1906, (English Translation, 1907) Jh. Japan, III.

MEXICO.

Nueva Farmacopea Mexicana, cuarta Edicion, 1904, Ph. Mex., IV.
Pharmacist's Manual and Formulary, (Agustin Guerrero.)
Bonchardi's Formulary.
Dujardin-Beaumetz's Formulary.
Gardette's Formulary.

HOLLAND.

Pharmacopœa Nederlandica, editie quarta, 1905, Ph. Ndl., IV.

SERBIA.

Pharmacopœa Serbica, editio secunda, 1908, Ph. Serb., 11.

RUSSIA.

Pharmacopœa Rossica, sixth edition, 1910, Ph. Ross., VI.

Formularies:—

The Taxa.

Dieterich's New Pharmacutical Manuel, 9th Edition, (Translated from German.)

Manuel Pharmaceuticum, (Hager) Translated from German.

SWEDEN.

Svenska Farma Kopen, (Pharmacopœa Svecica, edition IX) Ph. Sevs., IX.

VENEZUELA.

Farmacopea Venezolana, 1898, Ph. Ven., 1.

FINLAND.

Farmacopea Fennica.

PORTUGAL.

Pharmacopœa Lusitanica.

NORWAY.

Farmakopen Norvegica.

POLAND.

Farmacopea Polonica.

CUBA.

Farmacopea Oficial Espanola, Septima Edicion, 1905.

Formularies:—

Formulario Practico, (Dujardin-Beaumetz por Gilbert and Yvon.

LaOficina de Farmacia Espanola, (Segun Dorvault) Madrid, Spain.

IMPORTS OF POTASH SALTS IN FEBRUARY.

Public interest in the statistics regarding imported potash salts is keen, both by reason of their wide application in the manufacturing and other industries and the fact that the United States is still dependent upon foreign countries for practically the entire supply thereof. The following table shows the imports of potash salts during the month of February, 1915, compared with February of last year. The figures are so grouped as to show those potash salts used chiefly as fertilizers, which are entered by the long ton, and those which are used in the arts and chemical industries, of which the unit of quantity is the pound.

Articles Exported	February, 1914		February, 1915	
Fertilizer salts:—	*Quantities*	*Values*	*Quantities*	*Values*
Kanit .....tons	72,008	$321,723	1,852	$18,445
Manure salts.....do	12,451	124,422	900	14,748
Sulphate of potash.....do	5,098	210,327	1,378	59,804
Muriate of potash.....do	13,172	431,820	22,818	836,368
Other potash salts:—				
Carbonate of potash.....pounds	1,674,685	49,110	1,317,849	46,015
Caustic potash.....do	520,166	19,607	308,805	17,508
Nitrate of potash.....do	22,699	928	.....	.....
Cyanide of potash.....do	5,641	890	266,654	39,327
Other potash salts.....do	638,112	52,119	456,011	42,429

Contributed and Selected

FURTHER FACTS ABOUT DRUG IMPORTATIONS.

HARRY B. FRENCH, PRESIDENT OF THE SMITH, KLINE AND FRENCH CO.

Under the heading of "Some Facts Concerning Drug Importations," by Dr. H. H. Rusby, of New York, in the "Journal of the American Pharmaceutical Association," of February, 1915, Dr. Rusby criticises the article contributed by Mr. J. W. England, on "Drug Importations," in the January issue of the Journal.

Dr. Rusby states that he agrees with Mr. England's general conclusions and claims as there outlined. He adds,—"On the other hand, there are statements in Mr. England's article that have no basis whatever in fact, and there are others which can be justly weighed only in the light of existing conditions to which he makes no reference." Dr. Rusby picks out this statement made by Mr. England, —"It is manifest that such a system gives a large scope for the use of personal influence and offers the possibility of gratifying private grudges. It is not asserted or intimated that any of the officials of the ports of this country are guilty of such nefarious practice, but it is certain that the system encourages such practice." Dr. Rusby answers by saying—"It is very likely that at some ports where little business is done, and where very few persons are employed, such knowledge incidentally reaches the analyst, but this is not a design in the establishment of the methods."

Any one who is acquainted with the importations at different ports knows that this is no answer at all. It is true that, in the Port of New York, where the bulk of importations is made, the system may be so enforced that Dr. Rusby is not acquainted with the ownership of the goods, the samples of which he is examining, and in fact we know that this is the case, as Dr. Rusby has made a statement to that effect, and he has the confidence of every man, but this condition does not and cannot prevail at other ports, where the importations are exceedingly small as compared with the importations at the Port of New York. If the office of Dr. Rusby was filled by a dishonest official, there is no doubt that he could obtain any information that he might wish to obtain as to what lots were represented by the samples submitted to him for examination. The statement of Mr. England remains with undiminished force. Mr. England did not directly or indirectly state or infer that any of the present officials were dishonest. He stated, and this statement is based on facts and on experience, that the tendency of the system was to debauch public officials. We may add here that this is the tendency of all bureaucratic administrations, when such officials set themselves above the law and outside of the law, and claim that they are justified in taking extra legal or illegal action, if in their opinion such action is for the benefit of the public. This course has been repeatedly followed, and for the reason stated, by

officials of the United States Government in their actions taken under the Federal Food and Drugs Act.

Dr. Rusby criticises, also, Mr. England's statement that Government officials higher up are apt to support the findings of their subordinates. This statement on the part of Mr. England can be established by facts. It can be shown that importations were rejected by officials of the United States Government for reasons that were extra-legal or illegal, and that their action was supported on appeal to the authorities at Washington, although it was known at Washington that the grounds on which the lower officials refused admission were illegal. Dr. Rusby explains Mr. England's position by a remark that is not worthy of that high repute in which he is held by the community. We hold that the following remark is not an argument and is an unjustifiable attack upon those who are trying to remedy a defect in the law and a great wrong, that is now inflicted upon the American people.

Dr. Rusby states, that in his opinion, the reason for Mr. England's impressions is that, "An importer who has always insisted upon his approval of the objects and purposes of the drug law ,and who has given it his continued support, suddenly finds himself saddled with a shipment of the unfitness of which neither he nor any one else has any doubt." This expression of Dr. Rusby needs only to be stated to receive the condemnation that it deserves. He possibly may have the writer in mind, when he has made this statement. It is hardly necessary for the writer to define his position or the position of the house of which he is President, but he can call upon the Department itself to prove that he has gone so far as to re-export goods that have been released by the Department, which he was told were released through a mistake.

Dr. Rusby adds,—"The rarest thing in all my experience, although I have known it to occur, is for an importer to exhibit a willingness to have the law justly enforced when this would result in a loss to him." It is unfortunate that Dr. Rusby's opinion of business integrity is so exceedingly low, but from our personal experience, we can give him certain facts that show a willingness on the part of importers to take a loss rather than to accept the delivery of goods that are of inferior quality.

Quoting further from Dr. Rusby, he states,—"A far more serious question than any of the above is that of providing for judicial review of the findings of experts, which Mr. England strongly approves, and in which approval he is supported by many of the ablest lawyers, judges and legislators in the country. On general principles, it would seem clear that the importer should have this right and it is only the result of experience that can lead one to take the opposite view."

It is worth while to quote Dr. Rusby at some length on this argument as the appeal to Congress to revise the law and give importers the right to appeal to the courts, is the chief argument of the agitation that is now spreading throughout the country. We would ask your attentive consideration to the argument presented by Dr. Rusby against granting such a right to importers, and in considering his argument it must be borne in mind, that this is a right already conceded to all importers of merchandise into the United States excepting only importers under the Federal Food and Drugs Act. Importers under the Federal Food and Drugs Act only claim the same right of appeal to the court of appraisers and to

the United States Court of Appeals, that is now granted to other importers, and now for Dr. Rusby—

"All seizures of interstate shipments are subject to court review and many hundreds of such cases have been brought since the Federal Food and Drugs Act went into operation. At many of these trials, I have been a listener and I can recall scarcely any into which gross perjury did not enter. Were one to judge only by his observations of such a case, he would be likely to conclude that there is no other class of persons so dishonest as these expert witnesses. Leaving out of consideration all cases in which there is a fair ground of error and all differences of opinion, I do not hesitate to assert that in nearly all important cases one or more witnesses testify to what they know or fully believe at the time to be untrue. Our unfavorable opinion of these results must be qualified by the reflection that in most such cases, some experts have been asked to testify who have refused to do so, on conscientious grounds. Nevertheless, it is never difficult for an attorney to find one or more who are willing to thus degrade the profession. I have seen a chemist deny the pinkish-color which promptly appeared in the test performed in the court room while he was looking on. I have known a witness, after having sworn to an entirely different result from that which he had previously obtained, to retire under instructions of his attorney, so that he would not see the result of the same test applied in the presence of a jury and in this way would escape being compelled to state the truth concerning it. I have heard a witness testify that all volatile oils contain alcohol in varying amounts, oil of peppermint about 90%. In this case, because that witness occupied the chair of Materia Medica in a medical college, while the one opposed to him was in a college of pharmacy, it was only with great difficulty that the jury could be convinced that his testimony was incorrect. It is this ignorance of the jurors, their complete dependence upon the statements submitted, and their unfitness for grasping and interpreting technical facts, in which the danger of this method of deciding such questions principally resides. As to the tendency of the witness to speak correctly, we must consider whether government witnesses, with no other influencing motive than that of justly and impartially upholding the law, are more or less likely to testify truthfully than are men who have been offered a rich fee, often a temptingly large one, to say that for the saying of which they are to be paid."

You will note from a careful perusal of this argument that Dr. Rusby does not advance any argument whatever against the justification of this request on the part of importers, and indeed, he goes so far as to say that this appeal is supported by many of the ablest lawyers, judges and legislators in the country, excepting that his personal experience is that experts as a class are thoroughly dishonest and that being so, it would be wrong to give the right of appeal to American citizens, and that it is very much better to leave these questions to be settled as they now are; that is, in the hands of public officials who have autocratic power, who customarily act beyond the law and contrary to the law, because of their interests in the welfare of the people, and who are presumably honest and incorruptible.

It should not require more than a statement of this argument to show that Dr. Rusby has placed himself out of court and that his arguments are not worthy of serious men who still have some faith in humanity and believe that, on the whole, men are honest. It is unfortunate that in Dr. Rusby's argument he has failed to appreciate the basic principle that underlies the demand for the right of an appeal to the courts. If the right was granted, such appeals would not be made on a question of quality, excepting the importer had a sure case, for the reason that no merchant is going to expose himself to the public as an importer of inferior goods. The appeal will be made only when necessary to protect the importer against the extra-legal and illegal acts so constantly perpetrated at the present time by officials of the Government of the United States and for the purpose of correcting inequalities of administration at the different ports.

In the Declaration of Independence is stated that it is the right of every man to pursue "life, liberty and happiness." This statement is no longer true as ap-

plied to a very large section of the American people. It is within the power today of a combination of officials of the Government of the United States to drive a man out of business and so make it impossible to enjoy that right which our Declaration of Independence declares to be inalienable. It is probable that the law is unconstitutional, because it deprives the American citizen of this birthright, but this cannot be known until a case is carried to the Supreme Court. Congress has always been looked upon as the bulwark of the personal freedom of American citizens. In passing the Federal Food and Drugs Act without the right of judicial appeal, Congress, probably unintentionally, betrayed the most important interests of the people.

Bureaucratic government is the government of despotism. It is practiced to its fullest extent in Russia and there has a political as well as a civil application. There is no difference in the Federal Food and Drugs Act as now enforced in this country and the bureaucratic government of Russia, under which a citizen can be seized in the dead of night and disappear forever, excepting that this particular law applies only to civil matters. If, however, the American people tamely permit bureaucratic government such as this in a civil matter, the time will come when it will be extended to political matters. The power of a large section of the American people for the "Pursuit of Life, Liberty and Happiness" has been placed in the hands of the United States Government officials, more or less honest, and more or less able. There should be no hesitation in redressing this wrong. Those of your readers whose ancestors helped to make this country what it is, know well that it was their intention to build up a free government under the law. It was because of bureaucratic government that this country severed its relations with Great Britain. While the abuses now existing in the administration of the law justify this amendment, this argument is of secondary importance, and the basis on which those numerous organizations that have taken up this matter with so much interest make their demand, is government of the people under the law.

To the Editor:—

I thank you for permitting me to see proof of Mr. French's reply to my last article in the Journal. My views were correctly stated in that article, and they were based upon knowledge rather than opinion.

I will thank you to say that I disclaim the intent to refer to any particular house or houses, which would be an abuse of my position. My language, as quoted by Mr. French, "It is the rarest thing in my experience," etc., makes my statement quite general. I think the most difficult feature in the administration of the law, as to both foods and drugs, has been this very common endeavor to secure the admission of shipments, after their unfit character has been demonstrated. Indeed, this by no means tells the whole story. The possibility of succeeding in such attempts, under the peculiar provisions of the law, has largely frustrated its beneficent purposes, and it will eventually become necessary to devise some new legislation to prevent this procedure.

I would like to add that what Mr. French says about the general tendency of bureaucratic administration is fully justified. It is hardly too much to say that

this growing tendency is alarming. We differ as to its bearing on the administration of the Food and Drugs Act. I am quite as sure that an ordinary jury is not the proper body to decide such technical questions as the identity, purity and quality of drugs, as Mr. French is to the contrary. Decision by a properly qualified body is no more bureaucratic than by an unqualified one, as the common jury certainly is. Very truly yours, H. H. RUSBY.

THE PRICE OF SUCCESS.*

W. H. COUSINS, WICHITA FALLS, TEXAS.

Every desirable achievement has its price. Every step forward costs effort. The chap who said, "There is no excellence without great labor," was not an amateur in the game of life. The man who said, "Eternal vigilance is the price of success," had cut the cards in the great game until he knew whereof he spoke, for verily no man was ever born with this much wisdom. Such philosophy comes only from those who have had the tutorship of necessity, that grim teacher who is dean of the school of experience in which not only fools but even the wise must learn the hard lessons of life. In fact, we are mostly fools until we go through the hardships that are thickly strewn along the road to success. Success is not a stationary attainment; it is forever moving away from its pursuers, and its luring call of work, work, work, comes with every waking moment and in dreams. The amassing of a million dollars may not mean success. The million that means success is the earned million that came little at a time through unceasing vigilance and hard work, and not the million that came accidentally when fate was loafing on the job. Eternal vigilance and hard work will put the poorest business on this continent into pay dirt as a profit-maker. Eternal vigilance is head work. There are many better pitching arms in the big leagues than the twirling wing of Christy Mathewson, but greater heads there are none. Success in business is a big game that works head and hands to full capacity. Hands cannot win without head work. Head will never score working alone. Brilliant ideas are born only to die in an unsystematized business that needs arranging from the curb to the alley. The store that looks like first money in a clean-up contest will never get anywhere if the want book and the advertising are overlooked. Every business that is approaching success must have at least one man whose judgment is supreme. He is a kind of a court of last resort. He has observed, worked and toiled. No detail has escaped his eagle eye or his lightning powers of discernment. He has seen things happen and things that have happened once do not have to happen again to remind him of the effect that comes from a certain cause. Once in a great factory on whose pay roll were thousands of men, with many experts and each supposed to possess all the information that went with his job and to be able to cope with any situation that might arise, it happened that the belt on a big machine was slipping and the operator of the machine did everything he knew to do, to no avail. The master mechanic of the plant was called and exhausted his collection of tricks

* The Practical Druggist, March, 1915.

of the trade, including the pouring of sticky belt dressing on the belt to make it hold the pulleys, but it continued to slip. After all had given up in despair, they went to the private office of the "Old Man" who had established the factory more than thirty years ago. The problem that had baffled the expert was laid before him and he solved it in two minutes; in three words he said, "Tighten the belt." It matters not how small the business nor how large, there must be "an old man" (or a young one) who knows things and holds himself personally responsible for everything that happens and never makes an excuse when things go wrong or takes credit when they go right. No business ever succeeded where nobody carried responsibility. How many successful business men could you find in the whole world who would buy a business, employ enough clerks to operate it, and go away and leave it expecting to succeed? Success depends mainly on the man. Some men would arrive at success in spite of all the obstacles that can be piled into their paths. The man who succeeds must pay the price. He must play the game for blood. He must not muff the grounders, beef at the umpire or play to the grand stand. Any time he takes his gun eye off of the works a long fly will slip out of his mit and old "Compet" across the street puts one by for a home run. In "eternal vigilance" eternal means what it says. Not semi-weekly or every now and then, but every minute. The chap who thinks he has bought success and the goods are not delivered, did not pay for it. The money was not on the mahogany. He mistook eternal for occasionally. He loafed at the plate until the umpire called two and swiped at the third one, and missed it seven feet. I call to mind a hot-house confection who smokes, swears and wears men's clothes, who thought he had a half-Nelson on success. He blew up recently, and when the smoke had cleared away it was found that he owed various firms scattered along from Augusta to Galveston a matter of twenty-eight thousand dollars for drug-store merchandise that a burglar would move back into the store if he found them on the curb. This lad was not allowed to succeed. He was sandbagged by environment. He has a good heart inside of him, and if his heritage had been poverty, success would have been his. The old birds of the pill game would have held him up as a shining example of the man who whipsawed fate and won in spite of hardships and a muddy track if he had only been born poor. His old man was too strong with the bank parchment when Willie was being rubbed into condition for his life's work in a college of pharmacy. He propagated and grew an idea that the big thing in the knowledge works was to put a large-size crimp in father's standing at the First National. He buckled down and boned in school sometimes when he was not too busy passing out the coin and got away with the pure white lambskin with the gold freckle down in the corner. Father got a bill for the damage, the figures of which looked like the number on a Rock Island coal car. The invoice was for clothes, books and laboratory apparatus, with enough incidentals to pay for the college campus at the rate of a hundred bucks the front foot. Father merely groaned and asked for exchange on New York. The bank clerk thought he had bought an ocean liner or a railroad. When Willie fell off the three-forty-five limited, father was there to take a look at his Golden Calf. The old gentleman looked at him with one of those long, searching glances that he was always wont to bestow on a likely-looking piece of real estate that in a few years would grow a crop of installment-plan bungalows that would pay

seven hundred *per cent.* profit. Now Father had sat in where it took gold eagles by the shovel-full to stay and had threes beaten to a whisper. He had put thirty to one on a pony that died on the track with slow fever. He was an inexperienced man at coming loose from coin in hunks. But as he gazed on Son he classified him as the most expensive luxury he had ever tried to maintain. As he thought of him and looked at him his Daddy Nature softened and his affections got mushy. He said to himself: "Ain't he my boy? Ain't he a son of his little mother? Didn't he bring home the bacon? Ain't he got a sheepskin from the college and a clearance from the State Board? Will I let him go out and fight fate for success like I did? Not on your petrified likeness. By the eternal heck, I never piked and I won't commence it now. I'll buy him a drug store with gold fixtures and a private office." The latter decision was the bomb that sent Willie's chances of success Hadesward. Father bought the store and Willie bought everything that was for sale by the entire drug trade. It was the old story, with the sheriff in the last act. It took Willie just two years to erase his John Henry from Bradstreet's book of batting averages and give the creditors the sand bag square on the bean. Willie did not intend to do it, but he could have steered an ocean liner across the Atlantic just as easily as he could pilot the big store with the big expense account toward success. In paying for success money is not a legal tender. Grilling experience, bloody perspiration and sleepless nights are some of the things exacted of the man who would burn his John Henry into the exclusive scroll.

Really successful pharmacists in most cases began with a sink full of unclean vials in the tender years of childhood, and by putting every moment that can be spared from sleep to the task of getting information on the game, finally in the afternoon of life are able to retire from the tile and spatula and spend the gloaming finding out what has happened in the world during their exile. They know the great Remington, but never heard Tolstoi. They are familiar with Wilhelm Bodemann, but not wise to Elbert Hubbard. The sweet-faced bride of former years, now a gray-haired matron, on a Sunday morning in spring leads him into a church where a kindly faced minister extolls the joys of the great beyond and the beauty of the golden city; and in the daze he is catching himself wondering what rent the best corners will bring, and if the cigarette tax is the same in heaven as in San Antonio.

Alfred Henry Lewis told the whole story when he made his "Old Cattleman" say: "Success in life hain't in holdin' a good hand, but playin' a poor one well." I have seen more wrecks that were attributable to bad buying than to any other one cause. Many a little drug store that would be a miniature mint if the proprietor could be satisfied with his own profit instead of trying to get the jobber's profit also by buying more goods than he needs to save a small discount. A small retailer is beginning to get in the game when he learns to buy a gross of Sal Hepatica for eight dollars instead of paying ninety for it.

This wonderful feat is accomplished by buying each dozen with the same eight dollars with which he bought the first dozen. A jobber's 2% each month beats a manufacturer's five, once a year. Of course, there are several thousand other things to do in the retail drug business besides the buying. Any man in the business is entitled to pull a bonehead occasionally, but must not pull the same one

twice. There is no primrose path that leads to success. Primrose paths lead elsewhere; especially is this true of the retail pill game. Success never fluctuates in the market. Fate is a square dealer and sells it to all of us at the same price. Sometimes it leaves us with flighty heads and nervous hands, but when we win there is a sweet satisfaction in knowing that we beat the game. Every man in the game has more brain than he uses, more ability than he shows, and is capable of more effort than he spends. Every successful man must study his business if he is to know it. He may know it to-day, but he must keep his eye on the signals or won't know it to-morrow. Every bit of power, both mental and physical, that the human dynamo will generate and apply is THE PRICE OF SUCCESS.

STATE NARCOTIC LEGISLATION.

(EDITORIAL COMMUNICATION.)

THE enactment of the Harrison Act marks an epoch in the history of narcotic legislation. It furnishes a new and original method of controlling the manufacture, sale and use of narcotic drugs, through the U. S. Treasury Department. It is both a police and revenue measure. It is intrastate as well as interstate in scope, covering both the states and the nation, and to a degree, if not altogether, it eliminates the necessity for state narcotic laws.

The Harrison Act, with its system of registration and recording, is an experiment in narcotic legislation, and the results will be studied with deep interest, both at home and abroad.

Each state has its sovereignty. The Harrison Act cannot abridge or interfere with the operation of the laws of any state respecting the manufacture, sale and use of narcotic drugs unless such laws are in direct conflict with the Federal statutes.

There is a general tendency on the part of the states to amend existing narcotic laws, or enact new ones, along the lines of the Harrison Act, and this attitude raises a very important question:—

Is it desirable *at this time* for the states to legislate, or is it not more desirable, in view of the experimental nature of the Harrison Act, and the possibility that Congress may amend it at the next session, to await the results of the experiment, and then amend or delete?

At the March meeting of the Philadephia Branch, A. Ph. A., a resolution was offered by Dr. F. E. Stewart, seconded by Professor J. P. Remington, and carried unanimously: "That the Philadelphia Branch of the American Pharmaceutical Association hereby suggests to the Senate and House of Representatives of Pennsylvania that further legislation regarding the possession, sale, distribution and dispensing of habit-forming drugs be held in abeyance until a proper trial shall be given to the recently enacted Harrison Act intended for the control of the same, and that, therefore, further action regarding the bills now before the Senate and House relating to this subject be postponed in accordance with this resolution."

• Senate Bills Nos. 177, 185 and 198.

The following letter, addressed to the members of the Senate and House of Representatives of Pennsylvania, has been issued by the Philadelphia Drug Exchange:—

"A number of bills* have been introduced in the Legislature of the State of Pennsylvania modeled after the Harrison Act (H. R. No. 6282) for the regulation of the purchase, sale and possession of opium, coca leaves, their salt, derivatives or preparations, recently enacted by Congress and made effective as of March 1, 1915.

The Philadelphia Drug Exchange is in hearty accord with the purposes of the Harrison Act, but wishes to enter its most earnest protest against the enactment of State legislation along the same line, because it is absolutely unnecessary.

The Harrison Act is the result of years of study by experts of the Federal Government and representatives of Medicine and Pharmacy from all parts of the country, who carefully studied state and local conditions and framed a law that met the requirements of all sections.

From our technical knowledge of the conditions under which drugs are sold, we believe that the Harrison Act will prove to be the most effective law yet devised for minimizing the "dope evil" and that it should be given a fair and reasonable trial to demonstrate its possibilities and limitations before legislation of a similar character is enacted by the State.

Under the Harrison Act, dealers must keep a record of their purchases and sales of the interdicted drugs. Now, if each of the 48 states passes a law similar to the Harrison Act, dealers doing a national business will have to keep 49 sets of records, probably with widely varying requirements. Such a task would be most burdensome and with no compensating advantages to the public.

We trust you may see your way clear to oppose all narcotic legislation at this session of the Legislature."

At present, the existing state narcotic laws do not provide for the registration and recording of the manufacture, sale and use of narcotic drugs, and this omission makes them far less efficient than the Harrison Act.

It is claimed that the Federal law really does not go beyond the means of furnishing evidence to detect violation of the state laws, and that a state board of pharmacy securing evidence for prosecution under a state narcotic act would have access to the records required by the Harrison Act; but, the Commissioner of Internal Revenue has decided "that the board could get (and then only upon the payment of a fee) nothing in the way of a record except a verified copy of the statement of *purchases,* which revenue collectors may require; no records of any sales by wholesalers or manufacturers could be obtained in any manner unless it would be by the impracticable, almost impossible, procedure of getting the revenue collectors of districts to supply verified copies of a record of the purchases of every person registered in their districts—and this would not account for sales to persons outside the state. And when it had these records—if they could have been obtained—what could the board of pharmacy do? Nothing but report any discovered illegality under the Harrison Act to the Federal authorities!"—(N. A. R. D. Journal, 1915, 1159.)

If state narcotic laws are amended or enacted, and do not require the keeping of records, but depend upon the records of the Internal Revenue Department as evidence for prosecution, then the state will face the practical difficulties above mentioned, or if the state requires the keeping of records, also, then the work of the Harrison Act will be duplicated many times, and dealers doing a national business, or even business in a number of states, will have to keep numerous records and make numerous reports to the state authorities, and the result will be confusion worse confounded.

If the state narcotic laws are in conflict with the Federal Act, it should be determined whether such differences are important or unimportant, and then, of

course, if the differences are serious, the state laws should be made to conform with the Federal statute and with each other, *but,*

"Is it really necessary *at this time* to enact state legislation similar to the Harrison Act, in order to ensure proper and sufficient protection of the public?" Would it not be better for the states to wait until the Harrison Act has been tried-out? The Harrison Act is a good law, the best that has yet been devised, but its possibilities and limitations have not been determined, and its administration will doubtless reveal some defects. Why not wait, and then, in the light of experience with the Act, amend or enact state laws, if necessary, especially adapted to state conditions and in co-ordination with the Federal Act?

The arm of the Federal Government is longer than that of any state or municipality and much more efficient. It reaches into the remotest sections of the country, and experience may show that the Federal Act will serve the public—both general and pharmaceutical—much better than 48 state laws; and, that one law will be far less burdensome to pharmaceutical interests than 49 laws, goes without saying. J. W. ENGLAND.

PROFESSIONAL PHARMACY FROM THE VIEWPOINT OF THE COMMERCIAL LABORATORY.*

F. E. STEWART, PH. G., M. D.

By commercial laboratories I mean the laboratories of the great commercial houses engaged in the pharmacal and pharmaco-chemical industries. What are these laboratories doing for the medical and pharmaceutical professions? They are making most of the chemical, pharmacal and biological preparations used by physicians in treating the sick.

Why are the commercial laboratories making these preparations? Why are not the retail druggists making them? These closely related and mutually dependent questions cannot be answered in five minutes or in an hour.

As a general proposition it may be stated that the concentration of capital and the centralization of business has brought about this change.

No well-informed person will dispute that, from an economic standpoint, the business of manufacturing and dealing in medicinal drugs, chemicals and preparations of the same, can be carried on more successfully on a large scale, than when operated in a small way. This applies to all lines of manufacture and the drug business is no exception. The great department store is an outcome of this economic fact. The great manufacturing plants in all lines, exist because of it. The so-called trusts exemplify the same principle. The retail druggists, as a dealer in ready-made goods, is in competition with the department stores. As stated by the widow of an old-time prominent druggist in Philadelphia, "When I was a girl, no one thought of going anywhere but to a drug store for a sponge or tooth-brush, but now nobody thinks of going to a drug store for either. Everybody goes to the department store for both." While this statement is somewhat exaggerated, it illustrates the tendency of the times.

* Read at the February Meeting of the Philadelphia Branch A. Ph. A.

All will agree that true pharmacy is developing along the lines of higher education and greater technical skill. The standardization of medicinal drugs, chemicals and galenical preparations required by the Pharmacopœia is for the most part impractical except when conducted on a large scale, thus raising the practice of pharmacy, in this respect, above the reach of those retail druggists who are not doing sufficient business to make standardization work practicable.

The retail druggist, as a manufacturer of chemicals, is in competition with the great chemical houses with their laboratories and skilled chemists. What chance has he in such competition? Is there any reason why he should not purchase his supplies from the chemical manufacturing houses?

The retail druggist, as a manufacturer of galenicals, is in competition with the great commercial laboratories of the pharmaceutical manufacturing houses. While his chances in competition may be somewhat better than in competing with the chemical houses, the very fact that galenical manufacturing has been drifting away from the retail drug store into the great commercial laboratories, is a strong argument against the claim that the retailers can manufacture just as economically as the large laboratories. If he can purchase his supplies of galenical preparations from the manufacturing pharmaceutical houses at greater advantage than to manufacture them himself, is there any good reason why he should be denied the privilege? If he can prepare his chemicals and galenicals with greater economy in his own laboratory than to purchase them, he certainly does not display business ability if he does not do so.

There are of course two classes of pharmacists and manufacturing houses. One class regards pharmacy simply as a commercial business of barter and sale and the other class regards it as a profession. The former considers it perfectly legitimate to manufacture and sell almost anything for which there is demand or for which a demand may be created by advertising. The latter hold themselves responsible as professional men and experts in drugs and realize that the commercial methods of the former are incompatible with scientific and professional requirements. Professional experts cannot afford to employ misleading methods of advertising or give countenance to pretense and error in conducting their business. The moment the public has occasion to doubt the sincerity of their statements, their reputation as experts is gone, and they sink to the level of the charlatan and quack. Pharmacists in purchasing their supplies from manufacturing houses should not forget this distinction between professional pharmacy and pharmaceutical quackery, and should discriminate in favor of manufacturers who refrain from using such illegitimate commercial methods in their business or supply quacks with the products of their laboratories for carrying on the business of quackery.

The retail druggist, as a manufacturer of nostrums, is in competition with the commercial laboratories of the great manufacturing houses engaged in the nostrum business, but the nostrum business is not pharmacy. The nostrum business is the quack medicine business, whether carried on by a so-called patent medicine house or by the great manufacturing houses engaged in the pharmacal and pharmacochemical industries. True pharmaceutical practice consists in the selection, preparation, preservation, compounding and dispensing of medicines, prepared in accordance with common standards jointly adopted by the medical and pharmaceut-

ical professions and conforming with scientific and professional usages in their manufacture and sale. This is the true ideal of pharmaceutical practice. The false ideal is every pharmacist a manufacturer of his own nostrums and a prescriber of the same by recommending them over the counter as specifics or cures. The retail druggist who manufactures and recommends his own nostrums or the nostrums of manufacturing houses thereby becomes a quack doctor. He prescribes without a diagnosis and thereby violates the first essential to correct prescribing.

Before the advent of the advertising business, the retail druggist as a nostrum manufacturer was an individual quack doctor. The advent of the advertising business changed all this and to a large extent the retail druggist became an agent for the sale of nostrums manufactured by great nostrum manufacturing houses. The great manufacturing houses engaged in the nostrum business in advertising nostrums to the public are prescribing at long range without a diagnosis. The principle is the same whether the prescribing is done at long range without a diagnosis or at short range without a diagnosis.

Individualism in the practice of pharmacy is taught by every college of pharmacy and to the extent that such individualism is practicable, the ideal is correct, but individualism in the practice of quackery by pharmacists is not pharmacy. Such practice means pharmaceutical degradation.

Much of the so-called new remedy business carried on by the great manufacturing houses advertising to the medical profession is but another phase of the nostrum business. One class of nostrums is advertised in the newspapers to fool the people and the other class is advertised in the medical journals to fool the doctors. During the past thirty years tens of thousands of alleged new remedies have been introduced to the medical profession as wonderful discoveries in therapeutics. Not one-tenth of one *per cent.* of them have proved of any special therapeutic merit in comparison with older and better-known drugs used for the same purpose.

Now, it must be perfectly apparent that the retail druggists as manufacturers of nostrums and quack medicines cannot successfully compete with the great manufacturing houses engaged in this business.

It has been said that the retail druggist is threatened with extinction and this is not surprising under the circumstances. The question for us is:—What are you going to do about it? Many remedies have been suggested, one of which is the coöperative manufacturing of nostrums by commercial laboratories conducted under the control of retail druggists' organizations. But this plan is similar to that of the fish who jumped out of the frying pan into the fire to save himself from being served up for breakfast.

The pharmacists of New York recently had an opportunity to do something about it that would have placed pharmacy in the city of New York on a professional basis and gained public confidence. What did they do about it? Did they coöperate with Commissioner Goldwater in his attempt to force the nostrum manufacturers to publish their formulas so the public might be no longer deluded? No. They missed their opportunity and joined with the nostrum manufacturers in a protest against this. How can pharmacy expect to be ranked as a

professional vocation when the pharmacists as a body align themselves with those who prey upon the gullible public and exploit the sick.

I am saying nothing against the supplying of the public with pharmaceutical preparations made in accordance with scientific and professional requirements and dispensed to meet the demands of the public for legitimate household medication. That is one of the functions of the pharmaceutical profession. I am saying nothing against chemical and pharmacal manufacturing houses who introduce new and valuable therapeutic agents to the medical profession.

While we have all been debating what to do about it, the public has been waking up to the situation and the results are before us in drastic legislation which has been enacted and is being proposed for the protection of the public against fraud in the drug business. Why was it necessary to pass the Pure Food and Drugs Act? Why was it necessary to pass the Shirley amendment for the prevention of lying in advertising? Why was it necessary to pass the Harrison Bill to prevent the public from being debauched by habit-forming drugs? Were these bills aimed at the practice of true pharmacy, namely, the business of manufacturing and dispensing medicines, prepared in accordance with common standards jointly adopted by the medical and pharmaceutical professions, and dispensed to meet the demands of legitimate pharmaceutical and therapeutic practice? Were they not rather aimed at illegitimate practices on the part of physicians, druggists and the manufacturing houses?

Now, what is the remedy? Is not the remedy to be found in coöperation between the medical and pharmaceutical professions and the great manufacturing houses with their commercial laboratories having as its object the legitimate practice of pharmacy and medicine? Such coöperation means the elevation of pharmaceutic practice to the position of a learned profession, ranking as a peer with the other learned professions. It means the raising of the pharmacist to a higher position socially. The great commercial laboratories under such a system of coöperation would no longer be used for illegitimate purposes. They would be no longer employed for the manufacture of nostrums and quack medicines. They would be employed in the production of medicinal drugs, chemicals and preparations of the same, prepared in accordance with the latest scientific and professional requirements. The proper enforcement of pure food and drug laws, including amendments intended for the abolition of lying in advertisements, will bring this about. The educated and trained pharmacist will then be protected from unfair competition with quacks and pretenders. To the extent that each individual pharmacist is provided with capital and facilities to do his own manufacilities, he will purchase his supplies from the great commercial laboratories. own manufacturing because not properly provided with capital and laboratory facturing, he will be protected in so doing. To the extent that he cannot do his But in either case, he will maintain his individual responsibility as a professional man because he will be in position to guarantee that the medicines he dispenses in prescriptions and over the counter are made in accordance with common standards, jointly adopted by the medical and pharmaceutical professions.

It does not mean that new therapeutic agents will not be discovered and introduced commercially, but it does mean that this work will be done in coöperation

with the medical profession through the channels of original materia medica research. The work will be coöperative. In the coöperation the universities with their laboratories, hospitals and clinics will take part, and also the commercial laboratories of the great manufacturing houses engaged in the pharmacal and pharmaco-chemical industries. Thus the commercial laboratories instead of being a menace to professional pharmacal and medical practice will become of great service to the medical and pharmaceutical professions, to the science of medicine and to the cause of humanity.

THE HOUSE OF DELEGATES OF THE A. PH. A.

IN REGARD TO ITS BETTERMENT.

PROF. HENRY P. HYNSON.

The forty and more well organized and active state pharmaceutical associations which are most satisfactorily and efficiently protecting and promoting general pharmaceutic interests in the several states of which each is a part, are a positive pride and especially gratifying to all loyal and ambitious pharmacists.

All these state associations, you may be reminded, have exactly the same comprehensive character of membership. They include all the different phases of pharmacy and the basis of organization and the objects to be obtained are practically the same in all of them. So far as their diversified membership and the work they are doing is concerned, they are also in exact accord with the American Pharmaceutical Association of which they are proudly accepted children.

These state associations are in no way justly subject to adverse criticism, yet, they, like many other good things, should progress naturally, and their usefulness and helpfulness should be steadily extended. Indeed, notwithstanding all that has been accomplished by them, these organizations may be made of still more value to their local constituents and of immensely more assistance, nationally. How?

By giving them equal uniform and exclusive representation in a national body composed of their delegates. This may be done by giving them sole control of the House of Delegates of the A. Ph. A. Why?

Because, owing to the character of their membership, which is catholic, pharmaceutically, and not restricted to any special branch of pharmacy, the A. Ph. A. is the only national body with which they can consistently be connected, and the only one with the objects and work of which they can perfectly harmonize. In fact, they are now practically state divisions of the American Pharmaceutical Association; certainly, they are more possibly so and more nearly so than are any other class of local associations.

What advantages would follow correlating these state associations and more closely attaching them to the A. P. A.? Any one giving a moment's open thought to the subject will see. The assistance and interest of other state associations may be secured to further progressive measures originating in any one of them, if the measure is not strictly local. The accomplishments and the helpful experiences of one may be passed on to the many. The voice of each local association

may be heard by the others on national issues and the greatly desired uniformity of state laws and state measures may be more quickly secured, for instance, state pure food and drug acts, mercury bichloride regulations, poison labeling, weight and measure laws. There will always be interesting and helpful suggestions coming from the local bodies, regarding subjects that have been intelligently discussed "at home."

Representation in a national body will greatly stimulate and encourage these state associations, by giving them an outlet for their views and conclusions regarding national questions. It will give them vastly increased opportunities for action, such opportunities as they are seeking and must have.

To the A. Ph. A., the advantages of this more formal and more orderly connection will be manifold and far-reaching; the establishment of such a House of Delegates will at last make the American Pharmaceutical Association truly the national representative of pan-pharmacy, geographically and otherwise, and pan-pharmacy needs such representation just now to enable it to present a dignified, worthy and effective front when coöperating with other comprehensive representative bodies, such as the American Medical Association, the American Public Health Association or the American Chemical Society. Such a house of delegates will undoubtedly increase interest in the parent body and must, of necessity, bring greater loyalty for the A. Ph. A. in all state associations that have become an integral part of it through the House of Delegates. This greater interest will surely add individual members to the A. Ph. A., especially if such membership is made a pre-requisite to the office of delegate. It would be a happy sequel, indeed, if, finally, all members of the state associations should feel, in duty bound, to become members of the mother body, whose House of Delegates is composed solely of their delegates. It is safe to predict that these state associations *will* sooner or later get together just as the state boards have already become correlated. Why should it not be now and with the A. Ph. A.? This would be good for them and for it.

Now, then, what are the difficulties in the way? None, the getting rid of which would not greatly benefit and more consistently place all those involved. The disposal of the delegations that have been taking part in the transactions of the House of Delegates is absolutely all that is in the way of making it a creditably consistent, unusually useful, deservably desirable body.

Ninety-nine organizations appointed delegates and forwarded their credentials to the A. Ph. A. last year. Of these, six were purely local associations of retail druggists, which may have or should find national representation, like other such organizations in the National Association of Retail Druggists. Eleven sending credentials were local branches of the A. Ph. A., which already have full representation in the Council. Two were women's organizations, one of these an auxiliary of a national association, the other a local body; both could find agreeable placement in the Women's Section. Thirty were schools of pharmacy for which splendid national representation is offered in the American Conference of Pharmaceutical Faculties. Three were college alumni associations, which could more properly secure national representation through their respective schools or through the state association of the commonwealth in which their organization is

located. One, only, was a medical school, which is effectively represented, nationally, by the American Association of Medical Schools.

Delegates, representing the Executive Departments of the U. S. Government, the Republic of Cuba and the American Medical Association should, without question, be accorded much more respectful recognition at the General Sessions and should not be placed on an equal footing with the delegates from very small local associations, college alumni associations, local branches, *et cetera.*

There now remain but the six national pharmaceutic bodies, each specifically representative of some particular phase of pharmaceutical pursuit; these were N. W. D. A., N. A. R. D., N. A. B. P., A. A. P. C., A. M. M. P., N. A. D. C., and the thirty-six uniform state associations.

It is contended that the *National Associations* representing, nationally, the different phases or divisions of pharmacy should be given recognition at the general sessions, or should be formed into a congress to themselves, where they may equally discuss such matters as are of general interest to such national bodies as a whole.

Attempt has been made, and it is hoped that the attempt has been successful, to show that the already organized fully equipped state associations, which represent localities and not phases, so many as thirty-six of which appointed delegates last year, are the only bodies of the many, which can orderly and equally take part in such a house of delegates, also to show that such a body of delegates would be most helpful to the state associations and equally as helpful to the American Pharmaceutical Association and to American pharmacy as a geographical whole. What is your verdict?

Changes in the By-Laws. The only necessary change required in the By-Laws of the House of Delegates of the A. Ph. A., to accomplish that which is herein suggested, will be a change of Article 1, Chapter 11, which reads as follows:—

"Article 1.—Representation. The membership of the House of Delegates shall consist of three regularly-elected or appointed delegats from the Local Branches of the American Pharmaceutical Association, State and Local Societies, Colleges and Schools of Pharmacy and delegates from the National Association of Retail Druggists, National Wholesale Druggists' Association, American Medical Association, National Association of Boards of Pharmacy, Women's Organization of the National Association of Retail Druggists, National Association of Manufacturers of Medicinal Products, American Chemical Society, Association of National and State Food and Dairy Departments, Association of Official Agricultural Chemists, and from the departments of the Army, Navy and Public Health and Marine Hospital Service, the American Association of Drug Clerks, the credentials of whom shall be approved by the Council; together with the member of the Council, appointed by the chairman of the Council. The President, President-elect, Treasurer, General Secretary and the Chairman and Secretary of the Council shall be members *ex officio.*"

With the greatest possible respect for the incongruous mass of organizations named in the Article, it is thought no harm or discourtesy will be done to any of them and much greater respect will be shown for a number of them, by changing the Article to read:—

"Article 1—Representation. The membership of the House of Delegates shall

consist of three regularly-elected or appointed delegates from the several state pharmaceutical associations and from associations of a similar character regularly organized in the several territorial and insular possessions of the United States, provided such delegates are members of the American Pharmaceutical Association at the time their credentials are signed."

It will, probably, be desirable to have it understood and stated in the By-Laws that any action of the House of Delegates will be an expression of the sense of the assembled delegates of the state associations, also that the House of Delegates may appoint committees to execute its orders, but that no action of the House of Delegates will be binding upon the A. Ph. A., unless endorsed by the Council.

Messrs. F. H. Freericks, Joseph L. Lemberger, W. C. Anderson and F. M. Apple, members of the Committee appointed, with myself, at Detroit, "to investigate the House of Delegates and see if its usefulness could not be improved," are especially requested to make comment upon the subject in hand and communicate these comments to the other members of the Committee, including the chairman. Members of the House of Delegates and officers and members of the American Pharmaceutical Association are requested to make comments and communicate them to the chairman and other members of the Committee, either directly or through the Pharmaceutical Press. The editors of the Pharmaceutical Press are urgently requested to study the subject and take part in this discussion.

THE PERCENTAGE OF MOISTURE LOST IN THE PREPARATION OF SOME OFFICIAL AND UNOFFICIAL DRUGS.*

EDWIN L. NEWCOMB, P. D.

The following compilation of data, concerning the moisture lost in the drying of vegetable drugs, has been prepared from the record of student work in Pharmacognosy at the University of Minnesota. The drugs were collected during the first few weeks of each college year (September and October). Where washing was necessary to remove adhering soil, care was taken to remove all wash water before weighing the fresh drug. All drugs were dried at a temperature of about 80° C., except where otherwise stated. The drying was continued where artificial heat was employed, until all but two to four *per cent.* of the water was removed. A battery of five iron double-walled, gas-heated ovens were utilized for this purpose (v. 84, pp. 201-214, American Journal of Pharmacy). "Room temperature," as used in this paper, means from 68° to 70° F. This temperature was maintained by automatic thermostat controls.

	Percentage of Moisture
Belladonna Folia:—	
(a) 1913 Crop, leaves and tops not over 7 mm. dia., with flowers and numerous berries. (Average *percentage* of moisture lost in 30 samples)	71.00
(b) 1914 Crop, leaves only	82.00
Belladonna Radix:—	
(a) 1913 Crop. (Average of 29 samples)	75.00
(b) 1914 Crop. (Average of 2 samples)	73.6

* Presented to the Scientific Section, Minn. State Pharm. Assoc., St. Paul, Feb. 10, 1915.

	Percentage of Moisture
Stramonium, (Datura Stramonium):—	
(a) 1913 Crop, leaves and flowering tops with stems not over 7 mm. in dia.....	65.3
(b) 1914 Crop, leaves alone.....	83.00
(a) Average of 24 samples.	
(b) Average of 30 samples.	
Datura Tatula, (Stramonium, U. S. P. IX):—	
(a) 1913 Crop, leaves and flowering tops with stems not over 7 mm. in dia. (Average of 19 samples).....	65.7
(b) 1914 Crop, leaves only. (Average of 48 samples).....	82.7
Datura Laevis:—	
(a) 1913 Crop, leaves and flowering tops with stems not over 7 mm in dia. (Average of 17 samples).....	72.00
(b) 1914 Crop, leaves only. (Average of 8 samples).....	82.87
Datura Metelloides:—	
(a) 1913 Crop, leaves and flowering tops with stems not over 7 mm. in dia. (Average of 15 samples).....	72.5
(b) 1914 Crop, leaves only. (Average of 28 samples).....	83.00
Datura fastuosa coerulea:—	
(a) 1913 Crop, leaves and flowering tops with stems not over 7 mm. in dia. (Average of 30 samples).....	73.4
(b) 1914 Crop, leaves only. (Average of 9 samples).....	81.00
Datura atroviolaceae:—	
1914 Crop, leaves only. (Average of 19 samples).....	82.00
Datura fastuosa flava:—	
1914 Crop, leaves only. (Average of 7 samples).....	81.00
Datura fastusosa alba:—	
1914 Crop, leaves only. (Average of 27 samples).....	81.2
Digitalis purpurea:—	
Leaves of first year's growth. Cleaned from adhering soil and dried quickly at 80 to 100 degrees Cent.	
(a) 1913 Crop. (Average of 95 samples).....	80.9
(b) 1913 Crop. (Average of 62 samples).....	81.6
(c) 1914 Crop. (Average of 28 samples).....	80.3
(d) 1914 Crop. (Average of 51 samples).....	81.74
Digitalis grandiflora:—	
Leaves of the first year's growth, prepared the same as D. purpurea. (Average of 21 samples, 1913 crop).....	79.4
Digitalis lutea:—	
Leaves of the first year's growth, prepared the same as D. purpurea.	
(a) 1913 Crop. (Average of 21 samples).....	80.5
(b) 1914 Crop. (Average of 4 samples).....	81.00
Digitalis lanata:—	
Leaves of the first year's growth, prepared the same as D. purpurea. 1913 Crop. (Average of 7 samples).....	81.1
Digitalis ferruginea:—	
Leaves of the first year's growth, prepared the same as D. purpurea. 1913 Crop. (Av rage of 14 samples).....	78.6
Salvia sclarea:—	
Leaves of the first year's growth, cleaned from adhering soil and dried at room temperature. (Average of 15 samples.) 1913 Crop.....	81.4
Verbascum phlomoides:—	
Leaves of the first year's growth, prepared like Digitalis. (Average of 29 samples.) 1913 Crop	81.8

	Percentage of Moisture
Althaea officinalis:—	
Leaves of the first year's growth, cleaned and dried at room temperature. (Average of 22 samples.) 1913 Crop	66.8
Symphytum officinale and S. asperrium:—	
Leaves of the first year's growth, prepared the same as D. purpurea. (Average of 22 samples.) 1913 Crop	81.4
Mentha Piperita:—	
(a) Leaves and tops not over 10 cm. in length, cleaned and dried at room temperature. 1913 Crop, average of 51 samples (Humidity was high during the drying.)	73.5
(b) 1914 Crop, dried same as above, average of 51 samples (Humidity was low during the drying.)	80.00
Salvia:—	
(a) Leaves and tops not over 10 cm. in length, cleaned and dried at room temperature. 1913 Crop, average of 49 samples	70.4
(b) Leaves only, cleaned and dried at room temperature. 1914 Crop, average of 9 samples	73.2
Marrubium:—	
(a) Leaves and tops not over 10 cm. in length, cleaned and dried at room temperature. 1913 Crop, average of 20 samples	67.6
(b) Leaves only, 1914 crop, dried as above, average of 9 samples	74.00
Humulus:—	
(a) Strobiles dried at room temperature, 1913 crop, average of 17 samples	71.7
(b) Strobiles dried at room temperature, 1914 crop, average of 25 samples	76.8
Cannabis sativa:—	
(a) Pistillate tops dried at room temperature, sample contained many seed, average of 27 samples	69.2
(b) 1914 Crop, prepared as above, also containing some seed, average of 24 samples	69.7
(c) Pistillate tops collected from wild growing plants, with very few seeds present. Average of 6 samples	70.7
Ruta:—	
(a) Leaves and tops not over 10 cm. in length, 1913 crop, dried at room temperature, average of 14 samples	72.7
(b) Leaves only, 1914 crop, dried at room temperature, average of 6 samples	76.1
Valeriana:—	
(a) The carefully cleaned rhizome with about 10 cm. of the roots, dried at room temperature, 1913 crop, average of 46 samples	73.3
(b) 1914 Crop, prepared as above, average of 41 samples	74.4
(c) 1913 Crop, prepared as above, average of 29 samples	75.00
Levisticum:—	
(a) The roots and crown carefully cleaned by washing, and dried at room temperature, 1913 crop, average of 32 samples (2-year-old plants)	75.7
(b) Prepared same as above, 1914 crop, average of 5 samples (3-year-old plants)	64.00
Inula:—	
The roots carefully cleaned by washing, and dried at room temperature. 1913 Crop, 2-year-old plants, average of 32 samples	66.6
Taraxacum:—	
The roots carefully cleaned by washing, and dried at room temperature. 1913 Crop, 2-year-old plants, average of 32 samples	73.4
Althaea:—	
The roots carefully cleaned by washing, and dried at room temperature, not peeled. 1913 Crop, 2-year-old plants, average of 27 samples	65.6

	Percentage of Moisture
Phytolacca:—	
The roots carefully cleaned by washing, and dried at about 80° Cent. One-year-old plants, average of 48 samples	74.9
Apocynum:—	
The roots and rhizomes carefully cleaned by washing, and dried at room temperature. Average of 6 samples	60.00

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A CRITICISM OF THE UNITED STATES PHARMACOPŒIAL DESCRIPTIONS OF VEGETABLE DRUGS.

A THESIS SUBMITTED TO THE FACULTY OF PURDUE UNIVERSITY.

CHALMERS JOSEPH ZUFALL.

INTRODUCTION.

The inspection of crude drugs in a pharmaceutical manufactory requires continual reference to the descriptions of official drugs in the United States Pharmacopœia. While these descriptions are considered authentic, the question often arises, are they really accurate and correct for commercial drugs? Comments and criticisms are repeatedly found in the pharmaceutical journals which lead one to suspect inaccuracy on the part of the pharmacopœia committee which wrote these, and the purpose of this investigation is to determine how well these descriptions can be applied to the drugs of commerce and to authentic specimens.

The drugs are to be taken, one at a time, and large quantities of the material studied. The conditions for this study at the Eli Lilly and Company's plant are almost ideal, for we are able to see more than a mere sample from each bag; we can see the entire contents of the bags and bales as they are emptied in the mill-room ready for grinding. Then the pharmacopœial description is compared with as many authentic specimens as possible. The herbarium specimen is first checked up with the botanic authorities and then the crude drug, the herbarium specimen and the pharmacopœial description are compared. In many cases, three to five mounted specimens of the one species from widely-separated regions were used, thus giving any variations due to climatic conditions.

Aconite:—The six lots and ten samples examined show that the pharmacopœial description is correct for Aconitum napellus except as to the thickness of the root. Many roots were found to be 35 mm. in diameter at the crown. The pharmacopœia gives this diameter as "10 to 20 mm." It should be given as "10 to 35 mm. in diameter at the crown."

In order to aid in distinguishing the official drug from A. fischerii, which is being offered on the market as the true aconite, the pharmacopœia should add that the "starch grains are 4 to 12 microns in diameter." Those of A. fischerii are much larger, being 10 to 22 microns.

Apocynum:—The pharmacopœial description of Apocynum is "The dried rhizome of Apocynum Cannabinum, *Linne,* or of closely allied species of Apocynum.

The phrase "or of closely allied species of Apocynum" should be omitted, for this includes A. androsaemifolium, a "closely allied" species, so closely resembling A. cannabinum that it is difficult to distinguish between the two species, even when the plants are in flower. Yet, A. androsaemifolium has different medicinal properties and is used under the name of "Bitter Root." The foremost pharmaceutical botanists admit that they do not know the difference, and Henry Kraemer of the Philadelphia College of Pharmacy states that the only difference between these two roots is the presence of stone cells in the cortex of A. androsaemifolium and not in A. cannabinum. We have collected several specimens of the different species of Apocynum and are trying to establish the differences between these two species.

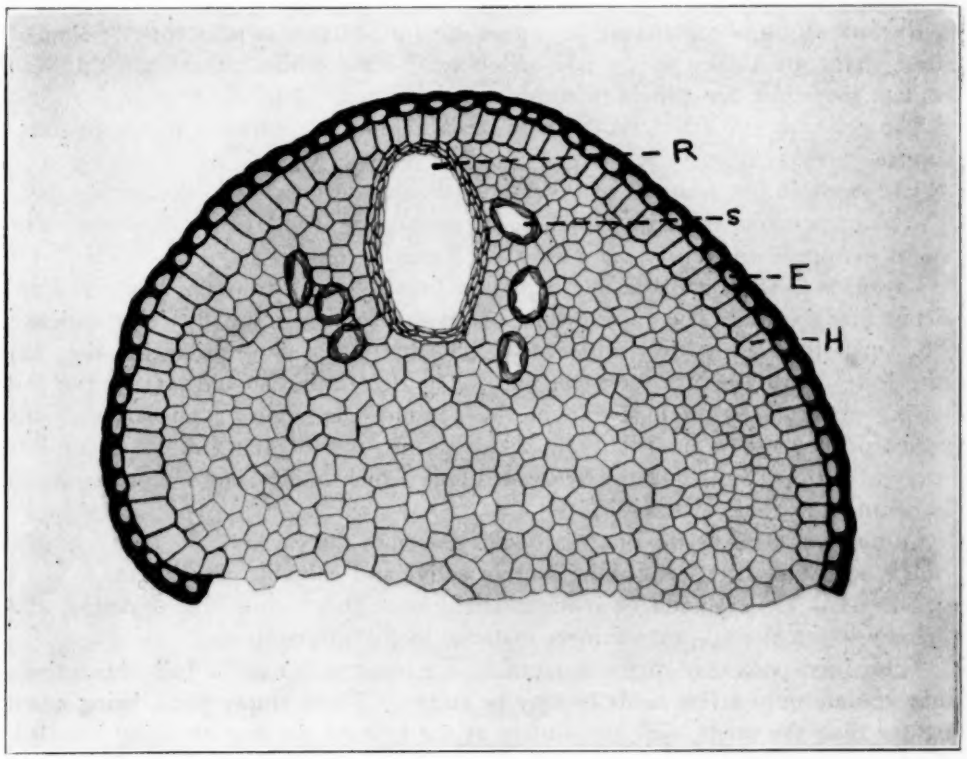

PLATE I.

SAVIN ADULTERANT—TRANSVERSE SECTION OF LEAF.

E, Epidermis; H, Hypodermis; R, Resin duct; S, Sclerotic cells.

Belladonna Leaves:—Belladonna leaves are often adulterated with the leaves and fruit of Scopola carniolica. The leaves of this adulterant resemble those of Belladonna so closely that it is almost impossible to detect it unless the fruit is present. So it seems wise to replace the phrase "frequently with the flowering tops intermixed," with the following, "usually with the tops possessing the dark brown or black, globular, indehiscent fruit, showing above the reflexed calyx

lobes." This will exclude the tops of Scopola which usually possess the yellow or light brown, subglobular, transversely dehiscent fruit which is almost completely enclosed by the thin, paper-like calyx.

The requirement of 0.3% alkaloids is too low for Belladonna leaves. In 61 assays of samples and lots made in the last five years only three have been as low as 0.3%. The average of these 61 assays is 0.44%. This indicates that the pharmacopœial requirement is too low for prime drug and should be raised to at least 0.4%.

Berberis:—During the examination of six lots, many Berberis roots were found to be 40 mm. in diameter so that the size should be changed from "3 to 20 mm." to "3 to 40 mm."

A peculiarity of Berberis not seen in other roots is that it splits upon drying. It would be well to state this in the pharmacopœia as one of the characteristics of Berberis.

Buchu:—It is impracticable to obtain Buchu without some stems. Some of these stems are thick, woody and undoubtedly inert while "others are thin and contain the active constituent in considerable amount." (1)

The *per cent.* and character of these stems should be controlled by the pharmacopœia.

The stems in five lots and of seven good samples offered for sale average .8%. The pharmacopœia should exclude Buchu containing more than 10% stems. The stems permitted should not be more than 1 mm. in diameter.

Capsicum:—During the last year, it was found difficult to obtain the real Capsicum fastigiatum. The Japanese pepper was offered continually for Capsicum. The small Japanese variety answers the pharmacopœial description, but they are of a lower quality and are less pungent. The description should include the following and thereby exclude all but the genuine Capsicum. "The cells of the pericarp are usually quadrilateral, 20 to 55 microns in diameter, more or less wavy in outline, walls indistinctly beaded and, which is most noticeable, arranged in distinct longitudinal rows." (2)

Cardamom:—While the pharmacopœia describes the cardamom "fruit" as official, it adds that "the seeds alone contain active and valuable constituents."

The seeds alone should be made official, since they alone are of value, and thereby lessen the amount of inert material in the preparations.

These inert pods may vary considerably, for some pods may be full while others may contain only a few seeds or may be empty. These empty pods, being much lighter than the seeds, will accumulate at the tops of the bag on being handled. Thus the druggist may get a large *per cent.* of pods in his first preparations made from a bag, while there may be very few in the last preparations; thus his products will vary considerably.

Since the seeds or "decorticated cardamoms" are plentiful on the market, there seems no reason why they should not be made official instead of the "fruit."

Coca:—The requirement of "0.5% ether-soluble alkaloids" is too low.

The average of 21 assays of lots and samples is .85% ether-soluble alkaloids, the lowest assaying .66%.

From these results it seems that the requirement should be raised to at least .75% ether-soluble alkaloids, for, if Coca leaves are properly gathered, properly

shipped and properly stored, they will give a much higher assay than the pharmacopœia requires.

Colchicum Seed:—The pharmacopœia requires only 0.45% Colchicine which would include rather poor seed. The average of 18 assays is .66% colchicine, the lowest being .53%.

These results indicate that first-class Colchicum seed will assay at least 0.6% colchicine, and the pharmacopœial requirement should be raised to this *per cent.*

Cubeb:—Cubeb berries grow in spikes, and in gathering the drug the whole spike is picked, which includes the peduncle. In drying and handling the drug, the berries become detached from the peduncles, which then occur as "stems."

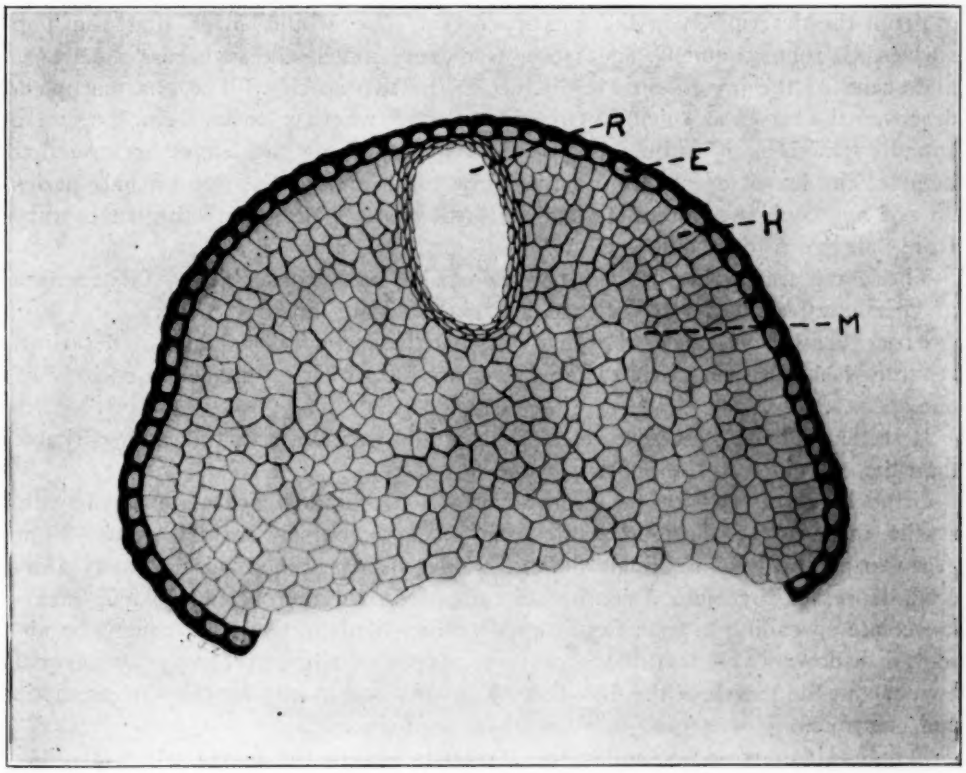

PLATE II.

JUNIPERUS SABINA—TRANSVERSE SECTION OF LEAF.

E, Epidermis; H, Hypodermis; R, Resin duct; M, Mesophyll.

Some berries on the market have no stems at all, while others have an excess of them. This indicates that the stems are removed from a part of the drug, for which a higher price is obtained, and these stems mixed with other lots and the average price obtained for it.

If stems are not deliberately added to Cubebs they will make a rather constant *per cent.* of the drug, so the pharmacopœia should specify that there shall not be more than 10 *per cent.* stems, and these should not be more than two mm. in diameter.

Ergot:—The examination of six lots, consisting of 154 bags, indicates that a few changes should be made regarding the color of the fracture and the pharmacopœia made to read as follows: "fracture short, gray, pinkish, blue or purple," instead of "pinkish, or reddish-white."

The thickness should be "from 3 to 5 mm." instead of "about 3 mm."

Grindelia:—The pharmacopœia states, "The dried leaves and flowering tops of Grindelia robusta and G. squarrosa," but does not state how much of the "tops." Since the activity of this drug evidently resides in the resinous exudation and since the resin is not found in the larger stems, the length of the "flowering tops" should be given so as to exclude the larger, inert stems. The maximum length should be 30 cm.

From the description in the pharmacopœia, one would infer that the two species, G. robusta and G. squarrosa, were very much alike, whereas the leaves and scales of the involucres are distinct in the two species. The pharmacopœia describes the leaves as "about 5 cm. or less long," whereas leaves 7 cm. long were found. "Lanceolate" should not be used in describing the leaves because that includes the leaves of G. Lanceolata, while the leaves of the two official species do not approach the lanceolate shape. Instead of "pale green" the leaves vary from pale green to greenish yellow.

The leaves are further described as "somewhat coriaceous, brittle." The leaves of Grindelia become very brittle upon drying and are not coriaceous.

From these discrepancies it seems best that the two species should be described separately because very often lots of drug arrive which are made up entirely of one species.

It seems that the following descriptions would be more scientific and workable than the one given in the pharmacopœia:—

Grindelia robusta:—Leaves 7 cm. or less long, broadly spatulate or obovate, sessile, more or less clasping at the base, finely to coarsely serrate, obtuse, light green to greenish-yellow, finely dotted, brittle; heads resinous-viscid, many-flowered, depressed-urceolate, 1 cm. broad, composed of numerous imbricated, linear-lanceolate spreading bracts; ray-flowers yellow, ligulate, pistillate sometimes absent, disk-flowers yellow, tubular, perfect; pappus of two or three mostly unequal awns about the length of the disk-flowers; taste pungent and bitter, odor aromatic and balsamic.

Grindelia squarrosa:—Similar to G. robusta except the leaves which are 4½ cm. or less in length and 8 to 15 mm. wide, usually decidedly oblong or oblong spatulate, obtuse, more or less clasping at the base, sharply spinulose-dentate, sometimes lacinite. The bracts of the involucre strongly squarrose.

Lupulin:—The results of examining five lots and 16 samples indicate that prime Lupulin has an amber-yellow color which should be given instead of "brownish-yellow." The latter color is seen only in drug which is not fresh.

There have been suggestions that the maximum ash limit is too low, but from our experience we know that it is not. Careless handling or willful adulteration are the only causes for the presence of the foreign mineral substance which causes the high ash in some Lupulin.

Savin:—The pharmacopœial description of Sabina is not specific enough to exclude several other species of Juniperus. Consequently, these other species are

found on the market offered for savin. The oils of these species are inactive and undoubtedly this is the cause of savin falling into disuse.

It is difficult to identify a species of the Juniperus from a twig alone, without specimens of the fruit and without knowledge of the form and habit of growth of the plant. The difficulty is twofold. In the first place, two plants which undoubtedly belong to one species, develop, if grown under varying conditions of soil and climate, very marked differences, both in general habit and in the character and mode of arrangement of the leaves. Juniperus sabina when found in the natural state, has decussate, ovate-lanceolate leaves, while the cultivated plant bears leaves which are more needle-like and sometimes in whorls of threes.

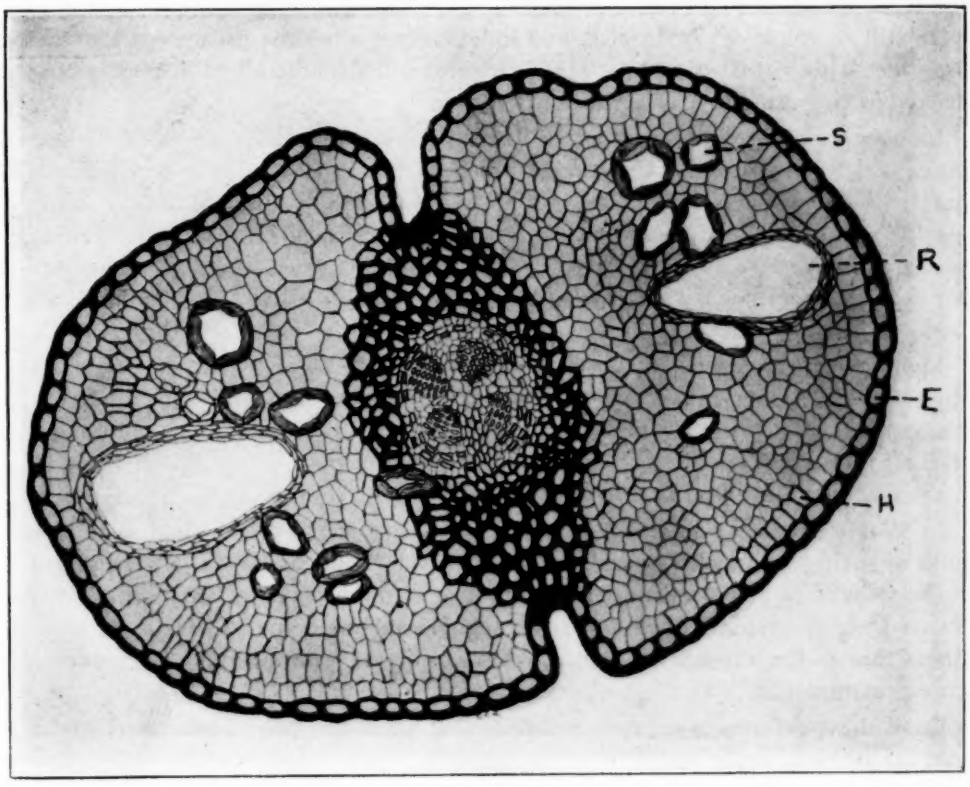

PLATE III.

JUNIPERUS OCCIDENTALIS—TRANSVERSE SECTION OF TWIG AND TWO LEAVES.

E, Epidermis; H, Hypodermis; R, Resin duct; S, Sclerotic cells.

In the second place, plants of different species have adopted a similar habit; for instance, forms of J. sabina, J. phœnicea, J. thurifera, J. barbadensis, J. virginiana, L. and J. scopulorum, Sarg. possess closely imbricated, acute or acuminate leaves, tightly appressed to the stems, and are externally almost indistinguishable one from another.

So variable are some of these plants that, of J. Sabina, seven varieties are recognized by Biessner and described by him in his "Handbuch der Nadelholzkunde."

In 1902, there was published by the Ecole Superieure de Pharmacie, Paris, a

thesis by H. Henri Mongin, entitled "Etude Anatomique de la fenille des Juniperinees." He pointed out that, in the drug of commerce, besides J. sabina, there were to be met with J. thurifera, L., and its variety gallica, and J. phœnicea, L. Most people would find it practically impossible to distinguish non-fruiting twigs of these species from the typical form of J. sabina. All have small leaves, closely appressed to the stem, giving the branches a cylindrical appearance. With fruiting specimens available, J. phœnicea is readily separated, having larger yellowish fruits, while the fruits of J. sabina and J. thurifera are small and bluish, resembling those of J. communis.

In 1874, M. E. Collin pointed out that the leafy twigs of J. phœnicea substituted for those of savin in French commerce. In 1902, M. Mongin found that they were still so employed in France, and indeed constituted the greater part of the drug met with in that country. He also points out that the oil of J. phœnicea is inactive, being similar to that of J. communis.

Mongin's work renders it possible to distinguish between J. sabina and these substitutes, even when only the young branchlets, usually met with in the commercial drug, are available for examination. J. sabina and J. thurifera and its varieties have the leaves in pairs, each pair being at right angles to the succeeding pair, i. e., they are decussate. In J. phœnicea, on the other hand, the leaves are not decussate, but are arranged more or less spirally with five leaves inserted almost at the same level.

Mongin further shows that large sclerotic or stone cells are found in the mesophyll of the leaf of J. phœnicea and less abundantly in J. thurifera, whilst they are completely absent in J. sabina. Another point of difference is the continuance of the hypodermal layer over the resin duct in the leaf of J. phœnicea, while in J. sabina the resin duct abuts directly on to the epidermis.

In 1905, Freeman stated that there occurred in commerce in Great Britain a form of savin "with more convex, less acute leaves, which are so closely appressed to the stem as to give a cylindrical appearance to the branchlets, very different it is true from the typical savin, but so closely resembling some of the forms of J. sabina that in the absence of fruit it is impossible to separate them by a microscopic examination." (3).

From these references we may conclude that savin has been adulterated for at least 40 years.

For some time there have been large quantities of so-called savin on the market which consists of twigs resembling somewhat the twigs of J. sabina, but the leaves are more convex, less acute and have an oval gland. By careful inspection it is noted that the arrangement of the leaves is not the same on all twigs. The drug is a mixture of about one-half twigs whose leaves are in whorls of threes and one-half twigs having decussate leaves. Branching twigs showed a peculiarity in that the branch had decussate leaves while the leaves of the twig were in whorls of threes. The latter fact indicates that the pharmacopœia is at fault, for these branchlets answer its requirements while the main twig of the same species does not.

In microscopic sections of this substitute, both the decussate leaves and those in whorls of threes, show the following characteristics as brought out in plate 1;

large sclerotic or stone cells in the mesophyll beside the resin ducts and the hypodermal layer extending between the resin duct and the epidermis.

A pressed herbarium specimen of J. Sabina showed the leaves all decussate, apex decidedly acute, longer, less convex and the gland linear-oblong. Microscopic sections show the absence of sclerotic of stone cells and the resin duct abuts directly on to the epidermis as shown in plate II. These characteristics indicate that, according to M. Mongin, the pressed specimen is properly named and that this substitute is not obtained from J. sabina. The leaves of the commercial drug are not arranged spirally, hence it is not obtained from J. phœnicea and the

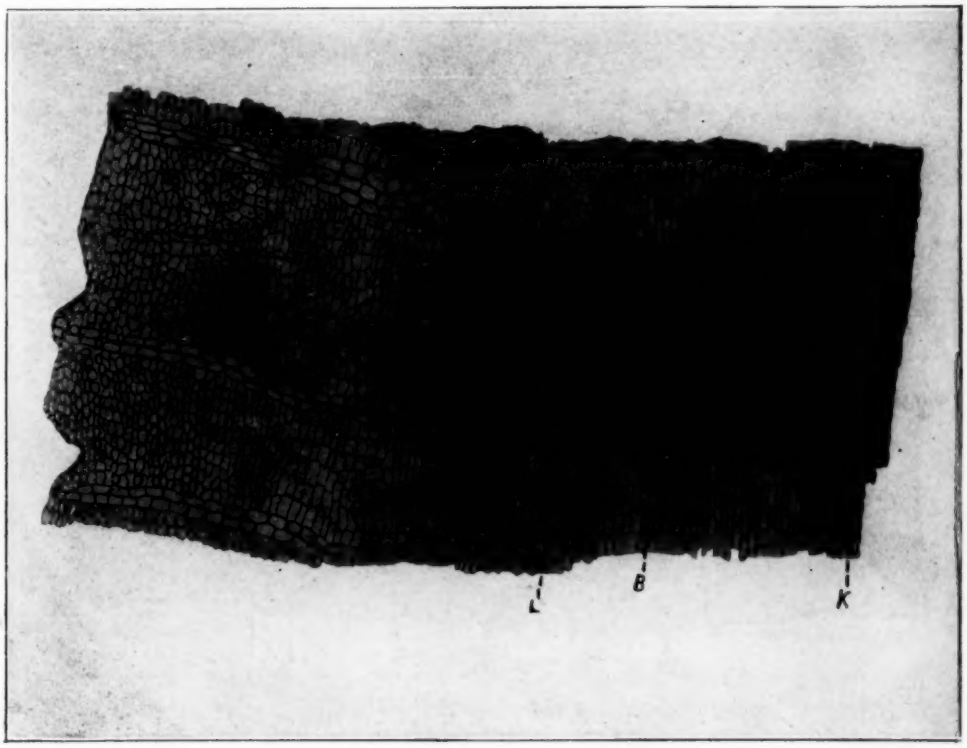

PLATE IV.

CRAMP BARK—COMMERCIAL DRUG—TRANSVERSE SECTION OF BARK.

B, Bark; L, Bast; K, Corky layer.

leaves are not all decussate, hence it is not J. thurifera. But pressed specimens of J. occidentalis, Hook, have short, oval, convex leaves with stone cells beside the resin duct and the resin duct separated from the epidermis by the hypodermis. This form shows the peculiarity of having the leaves in whorls of threes on the large branches, but the branchlets from these have decussate leaves. This indicates that the substitute which has been offered for savin is undoubtedly from J. occidentalis.

Three specimens of J. sabina obtained from the New York Botanic Garden show the following characteristics in contrast with those of this substitute; leaves

spreading, acuminate, all decussate no stone cells in the mesophyll and the resin duct abutting directly on to the epidermis."

In order to exclude all but J. sabina the pharmacopœial description should read as follows:—

Thin quadrangular branches bearing green, decussate leaves which are scale-like, ovate-lanceolate, acute or acuminate, appressed or spreading, imbricated; having on the back a shallow groove containing a linear-oblong gland; odor strong, penetrating, terebinthinate; taste disagreeable, resinous and bitter. In cross-section the leaves should show no stone cells and the resin duct abutting directly on to the epidermis."

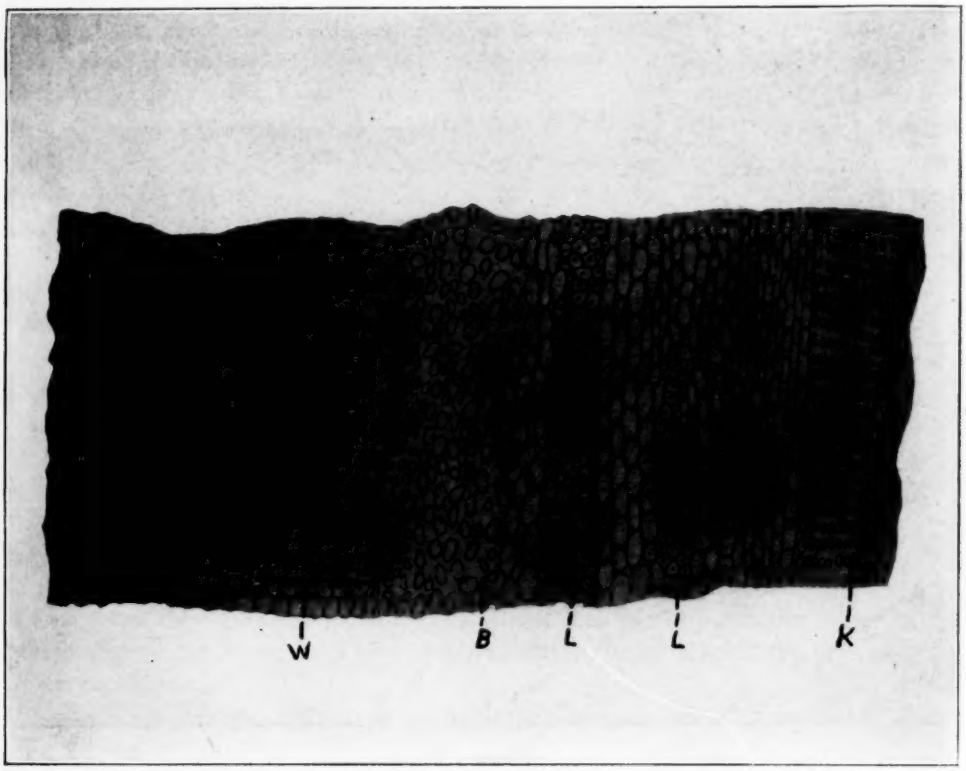

PLATE V.

ACER SPICATUM—TRASVERSE SECTION OF BARK AND WOOD.

B, Bark; L, Bast; K, Corky layer; W, Wood.

The fact that the pharmacopœia states that the leaves are dark green and have an oblong or roundish gland indicates that the description may have been made from commercial drug and not from known specimens of J. sabina.

Scoparius:—A more definite description would be obtained if, "Thin, flexible branched twigs, 2 to 3 mm. thick, externally dark green" were replaced by "Flexible, round light-green branches with five low, narrow ridges, 2 to 3 mm. thick; the smallest branches being uniformly 1 to 15 mm. thick, dark green, with five distinct wings."

Viburnum Opulus:—The pharmacopœia states, "The dried bark of Viburnum opulus *Linne*," and then describes the bark of Acer spicatum. Consequently the Cramp Bark on the market for the last twenty years has been the bark of Acer spicatum and, although it answers the pharmacopœial description, it is not the bark desired.

In 1912, Nathan S. Slatter, of Bennington, Vt., discovered that the Cramp Bark on the market was not the same as the bark of Viburnum opulus, but was that of Acer spicatum. He exposed the fact to Oliver A. Farwell, of Detroit, who confirmed Slatter's statement by comparing Cramp Bark of commerce with authentic specimens of Viburnum opulus and Acer spicatum.

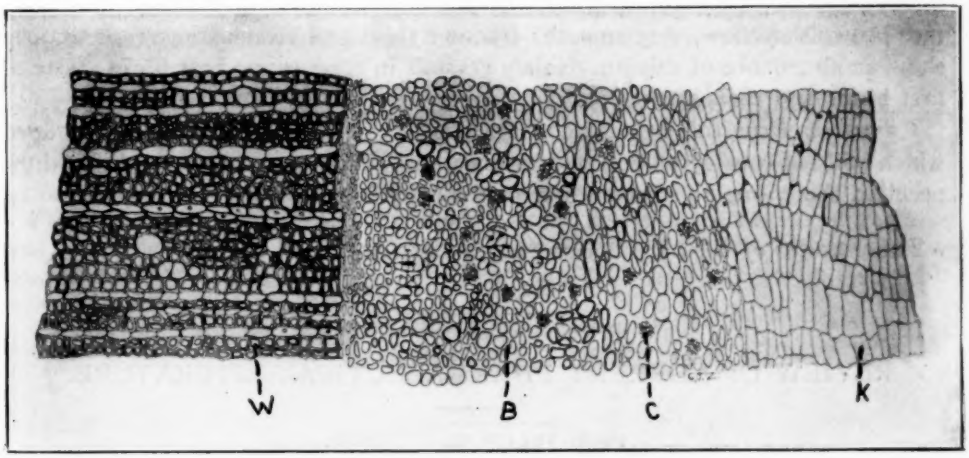

PLATE VI.

VIBURNUM OPULUS—TRANSVERSE SECTION OF BARK AND WOOD.

B, Bark; W, Wood; C, Calcium oxalate crystals; K, Corky layer.

1. H. H. Rusby in Merck's Report, Vol. XIX, p. 134.
2. Winton "Microscopy of Vegetable Foods," pp. 523 and 524.
3. "A Comparison of The Savin Leaves of Commerce," by Wm. G. Freeman in The Pharmaceutical Journal for Dec. 16, 1905, p. 829.
4. "Confusion Over Cramp Bark," by Oliver A. Farwell. The Bulletin of Pharmacy, Vol. 27, p. 65.

"Manual of the Trees of North America," by Charles Sprague Sargent.
"New Manual of Rocky Mountain Botany," Coulter and Nelson.
"Illustrated Flora of the Northern States and Canada," Britton and Brown.
"Flora of The Southeastern United States," John K. Small.
"Pflanzenfamilien," Engler and Prantl.
British Pharmaceutical Codex.

Farwell found that in 1895, a pharmacopœial committee of revision which tried to show the difference between Viburnum opulus and Viburnum prunifolium, used Acer spicatum for an authentic specimen of Viburnum opulus. This specimen was obtained from a large pharmaceutical manufactory and indicates that A. spicatum was used at that time for Cramp Bark. (4)

The sixth revision of the pharmacopœia under Viburnum opulus gives characistics undoubtely those of Acer spicatum. Such characteristics as "fracture tough, the tissues separating in layers," are surely not those of V. opulus, for the bark of the latter is very brittle and gives a sharp, clean fracture.

The findings of these two men led F. A. Miller to investigate the situation. He

obtained specimens of both Acer spicatum and Viburnum opulus from Arnold Aboretum, Missouri Botanic Garden, Baltimore Nursery, Kew Botanic Garden, and the German Botanic Garden. Sections and drawings of these were made and of commercial Cramp Bark. See plates 4 and 5. These drawings show clearly that commercial Cramp Bark is taken from Acer spicatum, for both show the bands of bast fibres and the absence of calcium oxalate.

The accompanying illustrations are representative of all the drawings made and show the desired points.

The pharmacopœia should replace the present description by the following:—"In transversely curved pieces or quills, of variable length, and one mm. or less thick; outer surface gray, longitudinally furrowed, small oval lenticels; inner surface brownish yellow, very smooth; fracture short and clean; transverse sections show an abundance of calcium oxalate crystals in rosettes, no bast fibres; taste at first bitter and then astringent."

Viburnum Prunifolium:—Two characteristics of this drug should be added which will aid considerably in its identification. These are the sour odor and the peculiar, short, smooth striæ on the inner surface of the bark.

Laboratories of Eli Lilly & Company, June, 1914.

REVIEW OF CURRENT PHARMACEUTICAL LITERATURE.*

PROF. JULIUS W. STURMER.

PHARMACEUTICAL ERA. (January.)

Stable Bichloride Solution:—Mercuric Chloride in aqueous solution containing also Sod. Silicate Sol. does not precipitate with ammonia. As the resulting ammoniacal sol. does not attack steel instruments, it may be found serviceable by the surgeon.

NOTE.—The author does not give bactericidal power of this solution as compared with ordinary Bichloride Sol. (J. W. S.)

Saccharin (and in particular its sodium salt) is converted into a bitter compound by action of fruit acids. The change takes place slowly at ordinary temperatures, more rapidly on application of heat.

CHEMICAL ABSTRACTS. (Jan. 20.)

Temperature of slaking lime:—1. At temperatures of about 270-300° wood is partially carbonized, and in the presence of oxygen, i.e., air, it ignites. A sample of lime from marble was found to attain a temperature of 390° during slaking, and the experiment proved that the slaking lime could ignite wood.

PHARMACEUTICAL JOURNAL. (Jan. 2.)

Ammoniated Mercury, constitution of:—The reaction with Hydrofluoric acid:— $2NH_2HgCl+4HFl=HgCl_2+HgFl_2+2NH_4Fl$ points to the formula $HgClNH_2$. That is, Mercuric Chloride with one Chlorine atom replaced by NH_2.

JOURNAL OF INDUSTRIAL AND ENG. CHEMISTRY. (February.)

Hard Wood Distillation Industry in America:—Interesting nine-page article by Edward H. French and James R. Withrow.

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*Read before Philadelphia Branch, February meeting.

MERCK'S REPORT. (January.)

Viscose Sponges:—The viscose which forms a dough with Sod. Hydroxide is kneaded with hemp fibre, and Sod. Sulphate Crystals are imbedded; then oval cakes are formed and immersed in Dilute Sulphuric Acid, which hardens the viscose. Finally, the Sod. Sulphate Crystals are dissolved by means of water, thus leaving cavities, which give to the mass a sponge-like appearance.

BRITISH PHARMACEUTICAL JOURNAL. (Jan. 16.)

Magnesia Carbonate, absorptive power of:—The experiment reported consisted in placing pieces of camphor wrapped in three layers of paper upon a cube of Mag. Carbonate also wrapped in paper. After two months the Mag. Carbonate had only a feeble odor of camphor, but on triturating the Carbonate with water a stronger odor developed, and on dissolving the Mag. Carbonate by the addition of citric acid, the odor developed was equal in strength to that of Spirit of Camphor. Accordingly, it is reasoned that Mag. Carbonate, like Charcoal, must be kept in air-tight containers least it become contaminated with volatile drugs.

AMERICAN DRUGGIST. (January.)

Peroxide Creams:—The article points out that animal and vegetable fats cause decomposition of peroxides, and that these fats are therefore inadmissable in peroxide cold creams. Petrolatum, starch paste, tragacanth paste, and also glycerin are recommended by the author as being unobjectionable, and suitable bases for such creams.

Liquid Petrolatum:—(February. Reprinted from the Report of the Council on Pharmacy and Chemistry of the A. M. A.) The article deals with the limpid oils used for atomizer sprays, and with the more viscid oils, obtained principally from Russian sources and used in intestinal stasis.

DRUGGIST'S CIRCULAR. (February.)

Spurious drugs:—An article well worth reading by John Uri Lloyd.

THE WOMEN'S SECTION AND WOMEN PHARMACISTS.

ZADA M. COOPER.

The first clause of the second article of the Constitution of the Women's Section reads like this: "The object of this Section shall be to emphasize the right and capability of women to engage in pharmaceutical pursuits as a means of livelihood." Other objects follow, all of them laudable, but this one statement is the basis for what I want to say. Under the circumstances, I suppose I cannot be altogether altruistic, but one very practical way suggests itself to me, one that I believe would benefit not only women pharmacists, but be of great value to women generally. I am also firm in the opinion that it would mean increased business to pharmacists, a fact that should enlist the interest of the women of this section who are not themselves pharmacists. But for its length, a better title for this paper would be, "How to convince druggists, now employing only men, of the need of women pharmacists, also."

To come at once to the point, the Women's Section might formulate resolutions expressing women's preference for drug stores where they can do business with women pharmacists; stating also their belief in the advantage to business; and requesting pharmacists to consider seriously the employment of women. If the resolutions should be approved by the Association they would eventually reach all

the members through the Journal of the Association. Perhaps the expense of sending copies by mail might be justified. Some other journals might publish them also, so that practically all druggists would be reached. At least, all that are worth reaching, all that we dare to hope to influence could be reached in this way. The druggist who takes no drug journal is unworthy of the title. He must be a mercenary individual or depraved and beyond reach of reform.

It would take generations to accomplish singly what the organization could do in a few years. Even if each woman were to say to the pharmacists of her community that she would like to deal with women pharmacists, it would have little effect. Men would think it only an individual whim, but if the Women's Section as a part of a great national organization so expressed itself, it would be taken more seriously and would have much greater weight. Men have known the powers exerted by organized effort for many years, but it is in comparatively recent times that women have learned the importance of coöperation. Club work is probably responsible for their getting outside themselves and overlooking minor differences sufficiently to make team-work possible. Evolution has taken us beyond the sociological stage where we "worked alone in tragic seriousness, unrelieved by a sense of humor." It has led us out into a broader usefulness where we are willing to coöperate with others. This is only one of the opportunities opening to members of the Women's Section for united constructive effort.

Without doubt there are some men who are honestly opposed to women pharmacists. They may perhaps admit a woman's abstract right to enter the profession if she so wills; they may even admit her value in *some* stores, but personally will have nothing to do with her. Even if all the women in America were to express themselves as preferring to do business in a pharmacy where there was a woman, still they would employ only men, either because they want only men's business or else because they do not want a woman about the establishment. We shall not quarrel with them, that is their privilege. On the other hand, there must be quite a proportion of druggists who have not given the question serious thought, at least from the point of view of their women patrons and the advantage in the way of increased business. It might be only necessary to bring the subject to their attention, to let them know that women are thinking about it, that women want it. Fair-minded individuals would be likely to investigate and honest consideration would convince some, not because they are so eager to grant women's requests, but because it is a plain business proposition. Women would not make such a request if it were only a passing whim. They believe that the druggists would reap some benefit as well as please them.

It is only right that it be made plain that eighty-five *per cent.* of the general merchandise sold is purchased by women and that something like the same percentage could hold with a druggist's wares. In the face of such a fact, druggists ought to see the importance of pleasing women; if a woman pharmacist is a factor in making satisfied customers, there should be no hesitancy in employing her. It is unquestionably true that lack of women pharmacists drives women to department stores for all sorts of sundries like toilet articles and toilet preparations and rubber goods that are legitimate sidelines for a druggist. Once there, they are led to buy drugs also. The pharmacy that numbers among its employees

a woman should get both the drugs and the sundry business of these people. There could be no objection to a druggist advertising the fact that his force includes a woman. Of course, it should not be sensational in character, but it is certainly proper to call the attention of women patrons to her presence. Possibly an announcement by letter might be excellent. It would only be necessary to say in a few well-chosen sentences that she is a competent pharmacist and that she is there to serve the woman patrons.

In any appeal to men-druggists, the Women's Section should assert the belief that every pharmacy in America employing more than one clerk, and even some of those should have a woman. We must concede that a druggist in a small town where paints and oils and wall-paper are handled, must have a man, unless he wants to do all that work himself. But if he does not deal in sundries requiring for their handling considerable more strength than women possess, even in a village a woman pharmacist would be desirable. In fact, I am inclined to believe that country women and women in small towns might appreciate a woman pharmacist more than their city sisters because they are possibly more reticent if not more modest than women of the cities. In the larger pharmacy employing several people, the proprietor can have no good excuse for not having one woman—no good excuse; he may offer many that seem good to him, but if he is conducting a decent honorable business, that very business would be increased by having a woman. If his business is not honorable and clean he does not need a woman, for he will have few women patrons. Women soon learn to avoid the saloon drug store or the one that has had a reputation for catering to "dope fiends"—usually one and the same.

Now and then I hear the statement that women are not loyal to their own sex, that they do not have faith in their professional ability. For instance, it is said that a woman who is seriously ill wants a man physician, even though she is in the habit of consulting a woman physician for minor ailments. If this be true, then it would be natural to conclude that women would not have faith in the capability of the woman who compounds her prescription, for the medicine may involve life or death as truly as the physician's diagnosis. Following the reasoning to a logical conclusion, all of the preceding appeal is in vain, but of that I cannot judge. If the idea has merit, it may bring results; at any rate, it may do no harm.

SENNA DRUG TRADE DIVERTED.

The export of senna from Egypt has been prohibited except to the United Kingdom and France. This measure is expected to center in London the trade in this useful purgative drug. The United States has been importing 2,500,000 to 3,000,000 pounds of senna leaves yearly. The Alexandrian senna commands the highest price, the March, 1915, quotations in New York City being quoted at 35 to 40 cents per pound for whole leaves. The Tinnevelly leaves from India are quoted at 16 to 17 cents, while pods are priced at 6 to 7 cents per pound. The Egyptian senna leaves are derived from *Cassia acutifolia*, which grows in Nubia and Kordofan, while the Indian or Tinnevelly leaves are derived from *Cassia augustifolia.—U. S. Commerce Reports, No. 63.*

Proceedings of the Local Branches

BALTIMORE.

The March meeting of the Baltimore Branch of the American Pharmaceutical Association was held Wednesday evening, March 17, in the Hynson, Westcott & Company assembly room at Charles and Franklin Streets, with President E. W. Hodson in the Chair.

The Executive Committee reported in regard to publicity for the Harrison act, that interviews had been held, conferences had been attended, letters had been written, copies of the law had been sent out, personal talks had been made and that the daily papers had printed lengthy and frequent articles about it, so that it was considered that everyone concerned should be informed as to its workings.

It was also brought out that the internal revenue officials had ruled that doctors need only sign their surnames in full to prescriptions and that initials would do for their given names.

The regular program was " Factors from Facts," the Secretary presenting a few factors which have been of considerable value in the day's work, both as time-savers and short-cuts. Little journeys were made through four of the Drug Journals by Messrs. Neal, Meyer, Morgan and Lowry, it being the intention to present one or some of the important items from the journals each month.

Mr. Lowry read extracts from a paper which had been presented to the Association and explained, that, as the part read contained some factors, the use of which might have a tendency to postpone the exclusive use of the Metric system, that the parent body in its wisdom thought it best not to publish this part of the paper.

He uses them regularly and finds them so convenient, that he felt others might also find them useful. He said that he realized that the safest factors to facilitate the use of U. S. P. and N. F. or any formula in the Metric system, were the weights and measures themselves. Yet, when we buy by the ounce, pound, pint and gallon and sell in the same old-styled, cumbersome but popular, customary, ever-present and always-with-us way and have to figure out cost, profit and selling price on the same basis, the old way is very convenient. If we need exactly one gallon of a preparation and make four thousand cubic centimeters, multiplying the one thousand formula by four, we will have almost a half pint too much.

The factors presented were multiplying ones and were intended to be used when the formula called for 1000 cc. of finished product.

A gallon is equivalent to 58418 grains, or 61440 minims.

If a formula for a gallon of a preparation calculated for 1000 cc. is wanted, all that it is necessary to do, is to point off three places in either of these two figures and multiply the quantities in grammes by 58.418, the product will be in grains, which can be reduced to avoirdupois pounds, ounces and grains; and to multiply the quantities in cubic centimeters by 61.44, the product will be in minims, which can be reduced to pints, fluid ounces, drachms and minims.

If tables be kept of the number of grains or minims in each ounce from 1 to 16, as well as tables by 500's from 500 to 7000 showing the equivalents in ounces and grains and in fluid ounces, drachms and minims, the conversion becomes easy.

For pints, divide either of these factors by 8. for quarts by 4, for a multiple number of gallons, multiply by the number of gallons wanted.

As an example, the U. S. P. formula for Syrup Orange Peel was cited. To make one gallon take,—

Tincture Sweet Orange Peel....	50 cc.x	61.44 =	3072 mn.=6 oz.	192 min.
Citric Acid	5 gm.x	58.418=	292 gr. =	292 gr.
Magnesium Carbonate	10 gm.x	58.418=	584 gr. =1 oz.	147 gr.
Sugar .....820 gm.x		58.418=47903 gr.	=6 lb. 13 oz.	215 gr.

Water, a sufficient quantity to make 1000 cc.x 61.44=61440 min.=1 gal.

Mr. Meyer mentioned that a quick way of approximating the price of a single item which has been priced by the gross is to multiply by .007. Example,—price $30.00 per gross, 30 x .007=.21, or 21 cents.

A gross of an item priced at the thousand

will cost practically 1/7 of the thousand price. Labels costing $2.80 per M will cost about 40 cents per gross. 1/7 of 2.80=40.

In reviewing the journals, the article which seemed to create most interest was one entitled "The Gold Mines of Pharmacy."

This caused quite a lengthy discussion. Mr. Hynson remarked that pharmacy *per se* is better now than in the so-called "good old days," and is on a higher plane and that the men engaged in it are of as high a class as they ever were, but that it is the environment of pharmacy that has caused so many to misjudge it.

In the so-called "good old days," it was associated with paints and putty, oils and glass, *et cetera*, and now it is associated with so many diversified interests that in many cases the drug stores of to-day are, in reality, department stores and, although the environment is different, yet the pharmacy in these stores is, as a rule, conducted on a high plane, and in some of these the pharmacy department is almost ideal.

Mr. John F. Hancock, who began his apprenticeship January 30, 1854, talked of what he believed were the "good old days," and grew quite reminiscent, naturally having a very deep feeling for the men with whom he had been associated.

Mr. Meyer and Mr. Schulze both emphasized that the head of the store should set the standard and be a good example both for the clerks and the public, and Mr. Morgan sized up the situation accurately when he arose and ended the discussion by saying: "The proprietor should be the pacemaker."

In criticising answers given by the journals to some of the queries, it was pointed out, that in many cases the answers show a lack of real knowledge and are therefore misleading; one answer carried out the common misconception that ichthyol is soluble in oil while it is a water-soluble complex ammonium salt or salts.

In an effort to find a remedy for the great changes in colors in the guaiac, honey and acacia mixture rather much used in Baltimore, it was suggested that the acacia be heated to 100° C. (212° F.), thus destroying the oxydase, and while this treatment would kill the ferment, it would not effect the emulsifying properti s of the gum. The same treatment was suggested for drugs containing ferments which were useless medicinally and which caused trouble or decomposition in the finished product.

The mentioning of guaiac in this prescription caused Mr. James Hancock to say that he rejected a large shipment of the resin which contained 37 *per cent.* of "exhausted tolu."

Attention was called to a new insecticide, Para-Dichlorobenzene, which has been given the O. K. by the United States Department of Agriculture. It is a non-inflammable and inexpensive crystalline substance which readily vaporizes, and as this vapor is heavier than air, it is placed above the articles to be treated, the vapor penetrating to the bottom. It ranges from 23 cents a pound in 5-pound lots to 15 cents a pound in barrels.

In discussing cold creams, it was pointed out that the solution of borax should be heated to boiling and the melted fats should also be hot, the hot borax solution should be added to the hot liquid fat and the mixture beaten till cold. Ointment of rose water of the Pharmacopœia made this way was much superior to one made by strictly following the directions. No change in the formula is necessary.

WM. J. LOWRY, JR., Secretary.

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CHICAGO.

The March meeting of the Chicago Branch held Tuesday evening, March 16, was attended by a large number of druggists, the attractive feature being a discussion of the operation of the Harrison Anti-narcotic Law lead by the Deputy Collector of Internal Revenue at Chicago. Deputy Collector Mahany read the most recent rulings from the Treasury Department at Washington and answered many questions. He stated that more than 12,000 applications for registration had been filed at the Chicago office, that the extra work involved had nearly swamped the office force, but that they would soon have things running smoothly. A number of additional inspectors have already been appointed and a strict enforcement of the law is certain.

In the discussion two points were brought prominently forward: First, the tendency on the part of newspapers to unjustly stigmatize pharmacists as "dope sellers," and, second, the very exaggerated exploitation of "doping" by the newspapers to furnish "scare-heads." As President Craig put it, "every crime in

the calendar from chicken stealing to murder is ascribed to 'dope' using or to 'dope' fiends."

Dr. Beal presented a resolution to the effect that the Branch formally protest against a statement published in the Chicago Tribune over the name of Dr. W. A. Evans. This statement, quoted from The Pharmaceutical Journal, was ascribed to a druggist and was to the effect that for every ounce of laudanum used in compounding physician's prescriptions, he sold a gallon over the counter, mostly to dope users. Dr. Beal said that this condition was certainly untrue of American pharmacy and unjust to American pharmacists and that because a few unscrupulous or criminal druggists sold dope was not a reason why all professional pharmacists should be so condemned. No more so than that because ten thousand persons are arrested, charged with crime, every year in Chicago, every inhabitant of Chicago should be stigmatized as a criminal. The statement of one druggist in England to the effect that he sold dope should not be applied to American Pharmacy, and, furthermore, Dr. Beal strongly questioned whether this statement by any means represented a general condition of British pharmacy.

William Loesch, speaking for the Economical Drug Co., stated that his firm filling more than 400 prescriptions daily, used but two gallons of laudanum in 1914.

James H. Wells, also in the loop district of Chicago, affirmed that his store used less than one pint of laudanum annually.

W. K. Forsyth, in the business district of the South Side, stated that he used less than one gallon of laudanum yearly and that most of this was employed in one physician's prescriptions for liniments and that he sold no laudanum over the counter. C. E. Storer, a North Side druggist, uses annually less than one-half gallon of laudanum, and this mostly in veterinary prescriptions. S. K. Sass, a prominent West Side pharmacist, uses not more than 1500 cc. of laudanum annually, and this exclusively in prescriptions, and these largely liniments. Never sold any over the counter.

These statements and other similar ones made by pharmacists in attendance at the meeting were all positively affirmed to be true, and so far as their experience went the same condition is true in most of the other drug stores. Furthermore, the city code prohibits the sale, except upon prescription, of opium and its alkaloids, cocaine and other narcotics, and during the past year, despite the fact that a vigorous investigation has been carried on so that most of the eleven hundred drug stores in Chicago have been visited, the inspectors have been able to convict less than twenty druggists for violation of this law.

Dr. Beal's resolution was unanimously adopted.

E. N. GATHERCOAL,
Secretary.

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CINCINNATI.

The monthly meeting of the Cincinnati Branch took place at Lloyd Library, Tuesday evening, March 16, 1915.

The meeting proved a very interesting and enthusiastic one and was well attended by the members and their friends.

A special feature of the meeting was the presentation of a highly interesting paper by Dr. John Ranley, entitled "Relations Between Doctors and Druggists."

The way the doctor discussed the Theory and Practice of Ethics from the medical as well as the pharmaceutical view-point was instructive to the appreciative audience, and it led to a spirited discussion, in which a number of members took part.

Prof. Theo. D. Wetterstroem followed with "A few simple tests," same tests being capable of being applied by the pharmacist, and being mostly dependent upon the physical senses: Smell, sight, taste, hearing, touch, as well as the solubility, color reaction, chemical reaction, rotation and refraction of light. Of special interest may be mentioned the applied tests for fixed and volatile oils, as well as those determining mineral oils in linseed or similar oils.

The paper of Prof. Wetterstroem was appreciated by the members and, upon motion, was referred to the Committee on Progress of Pharmacy for further discussion.

The President appointed the following Nominating Committee, with instructions to report at April meeting: William Lakamp, Louis Werner, Fred W. Weissmann, Chairman.

CHAS. A. APMEYER,
Secretary.

DETROIT.

The fourth meeting was addressed on March 19, by Prof. C. W. Edmonds of the University of Michigan on the subject of "Twilight Sleep." Professor Edmonds' talk was extremely interesting and was listened to very intently by all present.

He traced the history of this treatment from the use of morphine and scopolamine by Dr. Schmeidburg as a surgical anæsthetic in 1900, to its application for obstetric purposes in 1902, and the development of the method since. Articles on the subject in popular magazines were referred to as sensational and misleading. The alleged difference between scopolamine and hyoscine he thought had no foundation in fact, and that differences in effects are more probably due to personal characteristics and the frequency and amount of the doses.

The pharmacology of the treatment was described in detail, then general conclusions drawn from a study of about 800 cases as to its value.

The method is designed to destroy the memory of pain rather than to entirely deaden the pain itself, and when properly used, this effect is reached. The mother comes through the ordeal with less exhaustion and probably less suffering than without it. It needs continuous watching by the physician, however, and sometimes induces delirium, and so is not adapted to use outside of hospitals.

The effect on the child is more questionable, since the scopolamine narcotizes the reflex centers and hinders breathing, and a few cases of the death of the child have occurred due to its use. It probably lengthens the time of labor, and increases the need of the application of forceps.

The paper was discussed by Drs. Judd, Kamperman and Bell, who agreed in general with Prof. Edmonds' conclusions. Prof. Schlotterbeck discussed the question of the identity of hyoscine and scopolamine, and declared that there is no ground for considering them anything but identical.

The next meeting of the Branch will be addressed by Prof. V. C. Vaughan on the subject of "The Poisonous Group in the Proteid Molecule." This will be a joint meeting held on April 19 in conjunction with the Wayne County Medical Society, and the Detroit Retail Druggists' Association.

WILBUR L. SCOVILLE, Secretary.

NEW YORK.

The regular meeting of the New York Branch was held in the New York College of Pharmacy Building, February 8, 1915, President Roemer in the chair.

After dispensing with the reading of the minutes of the preceding meeting, the Treasurer's report was received with thanks. Mr. McEhlenie reported that the Council had referred the election of an editor for the Journal to a special committee and asked for instructions. The following resolution, "That it is the sense of the Branch that its representative in the Council cast his vote for the candidate for Editor of the Journal recommended by the special committee having the matter under consideration," was adopted.

The chairmen of the committees on Membership, Legislation and Education, and Fraternal Relation being absent, no reports were received.

Dr. Diekman, Chairman of the Committee on Progress of Pharmacy as usual had a very interesting number of abstracts. Among others he read the following: Distinguishing between natural and artificial camphor, a criticism of the methods of identification and purity of Cera flava of the P. G., detection of caramel with phenol-sulphonic acid, a new method for melting point determination of fats, a method for the estimation of boric acid in ointments, the stability of phosphorous when dissolved in fixed oils, cod liver oil as a remedy for insect bites and its uses in destroying the mosquito, misbranding of codein tablets, as well as a list of recent foreign proprietaries.

Mr. C. O. Bigelow as Chairman of the "Mayo Dinner" Committee reported that a surplus of $1.55 was on hand. The committee was discharged with thanks and the surplus ordered turned over to the treasurer.

A communication from the Board of Estimate of New York City referring to the standardization of pharmaceutical conical graduates was received.

Dr. Jacob Diner of Fordham University then read a paper on "Serum Diagnosis."

The speaker briefly reviewed the progress of serum diagnosis, beginning with the work of Gruenbaum and Gruber, the results of which led up to what is now known as the Widal reaction for typhoid fever.

After discussing the theory of agglutination and the technic of the method, with some explanation as to how to obtain the serum,

and how to interpret results, the speaker led up to the second important step in serum diagnosis, viz.: the Wasserman reaction for the diagnosis of syphilis. The theory and technique were explained in detail, particularly the line of reasoning and experimentation that led up to the use of the so-called cycles or systems. After describing in detail the three essential factors necessary to produce hemolysis, viz.: 1, the blood corpuscles of the same species which were used for immunization, called *antigen;* 2, the specific immune bodies created by the immunized animal after frequent injection of that particular antigen, called *amboceptor;* 3, the substance destroyed by heating the immune serum (thermolabile) and restored by the addition of normal, non-immune serum, from animals of the same species, called *complement;* the speaker demonstrated how the reaction is carried out.

Brief mention of the work done by McDonagh and Klein in their application of the foregoing principle to the diagnosis of gonorrhea was followed by the description of the Abderhalden reaction first used to diagnose pregnancy in its early stages, based upon the presence or absence of ferments in the blood of the patient capable of digesting albumins and thus causing them to become dialyzable. This reaction is now largely being used in the diagnosis of cancer.

The very interesting paper was discussed at length by Messrs. Weinstein, Hohman, Roemer, Wimmer, Raubenheimer and Mayo.

Many queries were answered by the author. A rising vote of thanks was then extended to the latter.

During the transaction of routine business, President Mayo of the parent association entered, accompanied by Professor Hynson of Baltimore. They were given a rousing reception and responded with some very apt and well-chosen remarks.

JEANNOT HOSTMANN,
Secretary.

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NORTHWESTERN BRANCH.

The March meeting was held at the Nicollet Hotel, Minneapolis, Thursday evening, March 18, 1915. The meeting was preceded by a dinner and by a brief business session of the Minneapolis Retail Druggists' Association. As this was the annual meeting of the Branch, reports were received from the various officers, and the annual election took place. Secretary Newcomb reported briefly upon the work of the past year and referred to the sixteen new members acquired by the Branch since the last annual meeting.

The Nominating Committee reported the following names as nominations for office during the coming year: President, A. D. Thompson, Minneapolis; Vice-President, Truman Griffen, Minneapolis; Secretary-Treasurer, E. L. Newcomb, Minneapolis; Executive Committee, F. A. U. Smith, St. Paul; F. M. Parker, St. Paul; S. W. Smetana, Hopkins; A. J. Kline, Minneapolis. The names as presented by the committee were unanimously elected.

By motion the Branch voted an assessment of $1 upon each active member to defray the e penses of the Secretary in connection with the sending out of meeting notices, etc.

Communications were read concerning the preliminary report of the Transportation Committee and copies of the report were distributed among those present.

The Branch concurred in the resolution concerning the death of Mr. Frank W. Klenert, adopted earlier in the evening by the Minneapolis Retail Druggists' Association.

The regular program for the evening was as follows:

1. The Assay of Spiritus Aetheris Nitrosi and Acidum Hydrochloricum Dilutum, with demonstrations. By Prof. G. Bachman.

2. A continuation of the discussion on Spiritus Aetheris Nitrosi, Acidum Hydrochloricum Dilutum, etc., begun at the Scientific Section meeting of the Minnesota State Pharmaceutical Association. The best methods for the preparation and preservation of the above-named products.

3. The latest rulings on the Harrison Anti-Narcotic Law.

4. The State Anti-Narcotic Bill and its provisions.

Professor Bachman's demonstration of the assay of Sweet Spirit of Niter was highly appreciated by the members present and elicited many questions. The apparatus designed by Prof. Frank X. Merck was exhibited and its use demonstrated. Prof. Bachman submitted the following concerning Sweet Spirit of Niter and urged each pharmacist to give strict attention to this preparation in order that the physician may obtain the result which he has a right to expect:

1. Do not make up more than the quantity

sold within a month. Buy the concentrated Spirit Niter, preferably in hermetically sealed tubes. The conents of one of which will make a pint of Sweet Spirit of Niter.

2. Keep the Spirit in completely-filled bottles in such sizes as are usually called for by the trade and these should be stored in a cool place protected from light.

3. Air space in the bottle has much to do with the decomposition of the Spirit.

4. Do not expose the spirit to sunlight, as this is one of the chief causes for spoiling.

5. Amber-colord bottles afford good protection to the Spirit.

The paper by Prof. Bachman was discussed by Messrs. Griffen, Frost, Pres. Thompson, Dean Wulling, Schmidley, Kline, Danek and others. Mr. F. A. U. Smith explained in detail the reasons why amber-colored bottles afford a protection to the substance contained therein, which are susceptible to the actinic rays of light. Attention was called to the indiscriminate use of blue bottles for preparations which should receive the greatest protection from chemically active light rays.

Following this discussion, the matter of a joint meeting between Twin City physicians and Twin City pharmacists was brought up and after discussion, the following motion was unanimously passed: "Moved by Dean Wulling, seconded by Mr. Frost, that the Secretary be instructed to communicate with the Chairman of the Minneapolis Retail Druggists' Association and the Chairman of the St. Paul Druggists' Association, requesting each to appoint one pharmacist, who with a member of the Northwestern Branch, A. Ph. A., to be appointed by the President, are to constitute a committee of three to bring about not later than early May, a joint meeting of pharmacists and physicians of Minneapolis and later a joint meeting of pharmacists and physicians of St. Paul, the committee to have power to make necessary arrangements."

Mr. John P. Jelinek, Chairman of the Legislative Committee of the State Association, spoke on the state anti-narcotic bill and its provisions and urged the support of the Branch for the passage of the bill by the 1915 session of the Minnesota legislature. After some discussion, the bill was endorsed by the Branch.

About 50 attended the dinner and meeting.

E. L. NEWCOMB,
Secretary Northwestern Branch.

PHILADELPHIA.

The regular monthly meeting of the Philadelphia Branch was held on Tuesday evening, March 9, at the Temple College of Pharmacy.

President E. Fullerton Cook called the meeting to order at 8:30 p. m. The minutes of the last meeting were read and approved.

The Treasurer reported receipts $99.50, expenditures $40.75, balance of $58.75.

Mr. Thum moved that the Treasurer's report be acceptel. The motion carried, and Messrs. Quintus Hoch and J. Atlee Dean were appointed as a committee to audit the books.

The program of the evening was then taken up and Prof. Joseph P. Remington gave an illustrated description of the U. S. P. IX in various stages of its revision.

Prof. Henry Kraemer discussed "The Botany and Pharmacognosy of the U. S. P. IX."

Prof. Charles H. LaWall gave a summary of the changes in "Standards and Tests for Inorganic Chemicals in U. S. P. IX."

Dr. Robert P. Fischelis presented "The Current Review of Pharmaceutical Journals."

After the program had been concluded, Prof. F. E. Stewart ntroduced the following resolution:—

Resolved, That the Philadelphia Branch of the American Pharmaceutical Association hereby suggests to the Senate and House of Representatives of Pennsylvania that further legislation regarding the sale, possession, distribution and dispensing of habit-forming drugs be held in abeyance until a proper trial shall be given to the recently enacted Harrison Law intended for the control of the same, and that therefore further action regarding the bills now before the Senate and House relating to this subject be postponed in accordance with this resolution, and

Resolved, That a copy of this resolution be sent to the several state medical, pharmaceutical and drug organizations asking their coöperation in securing the postponement of further legislation regarding habit-forming drugs until the Harrison Law has been properly tried out as aforesaid.

The resolution was seconded by Prof. Remington and passed by ballot.

The Committee on Nominations was called upon for a report, and Mr. Joseph W. England, Chairman, presented the following report:—

Your Committee on Nominations would respectfully recommend the following nominations for 1915-16:—

President—S. C. Henry.
First Vice-President—J. W. Sturmer.
Second Vice-President—W. G. Neebig.
Secretary-Treasurer—J. Ed. Brewer.

COMMITTEES.

Practical Pharmacy—Charles H. LaWall, Chairman, O. W. Osterlund and J. C. Peacock.

Membership—A. J. Staudt, Chairman, Quintus Hoch, Frank E. Morgan.

Professional Relations—William L. Cliffe, Chairman, Francis E. Stewart, M. D., and Franklin M. Apple.

It was moved and carried that the President be instructed to cast the ballot for the officers as submitted by the Nominating Committee.

Prof. Remington introduced the new officers, preceding his introduction, with a short eulogy of each. The meeting then adjourned.

J. ED. BREWER, Secretary.

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PITTSBURGH.

The February meeting of the Branch took place too late in the month to permit of its proceedings appearing in the journal of that month.

Dr. Blumenschein referred to the action taken at a former meeting, at which time a resolution was adopted instructing the Secretary to ocmmunicate with the distributors of Creolin-Pearson calling attention to the erroneous practice of labeling that article "Non-Poisonous," and exhibited at this time a bottle of the article from which these misleading and dangerous words were omitted, which Dr. Blumenschein said shows the usefulness of our taking up such matters and acting upon them.

A communication was read from Mr. P. Henry Utech, of Meadville, Pa., offering to present an interesting paper at an early meeting upon the subject, "European Pharmacy and Pharmacists," based upon his travels with the German Apothekers Verein, in 1914. It was accepted with thanks, and Mr. Utech will present his paper at the April meeting.

Dr. Emile F. Krapf, of the Radium Co., of Pittsburgh, was introduced as the speaker of the evening, his lecture being on the subject of Radium, with illustrations covering many features of the production of that substance, and it proved to be the most valuable and intensely interesting talk the members have ever been favored with. The source, manner of securing the carnotite ore, pitchblende and autunite, method of applying radium in the treatment of disease, and the use made of Radio-active-Earth in plant growth and crop production were described. He also exhibited specimens of radium and made numerous tests of its powers. The radium facts presented were, as epitomized:—Discovered in 1896 by Madame Curie; the half life period of radium is 2000 years radium emits three rays known respectively as alpha rays, beta rays, and gamma rays; alpha rays are positively charged helium atoms, shot out with a velocity of 12,000 miles per second, beta rays are negatively charged particles, about 100 times as penetrating as the alpha rays and are of the same type as the cathode rays; gamma rays are analogous to X-rays, but more penetrating than the X-rays produced in a hard vacuum tube. Radium is extracted from carnotite ore, pitchblende and autunite. One gram of radium element represents about 400 to 800 tons of carnotite ore; seven hundred tons of chemicals, exclusive of water, are used in extracting one gram of radium. Twelve grams of radium element is the annual output of the Standard Chemical Co., of Pittsburgh, many times the entire European output. The price per gram of radium element is $120,000 to $160,000. Dr. Krapf exhibited numerous samples of ores, radio-active-earths, also clocks and watches the hands and figures being treated with radium so that the time can be readily seen in the darkest room.

A general discussion of the Harrison narcotic law was opened by Mr. Andrew Campbell, which threw much light on the law's provisions and its application.

Dr. George W. Kutscher, the new President, was inducted into office and in his inauguration talk promised to eliminate all the dead timber among the membership and utilize the live ones to the limit.

The March meeting on the 12th was treated to a very excellent paper by retiring President Andrew Campbell on the subject, "Hydrogenated Oils," from which we make but a short excerpt:

"Much has been reported and written about the possible wonderful cheapening of soapmakers' materials, but this has been considerably exaggerated, at least for the immediate future. . . . .As the process becomes better developed and more widely used very material reductions in price of the products may be reasonably expected. . . . . The two greatest apparent fields of usefulness for such

a process seem to be the production of edible fats and the bringing into range of soap-making materials vegetable and animal oils which have hitherto been unavailable on account of the relative softness of their products or for certain other technical reasons. Hardened oils will probably find other wide uses in the arts, for example in the manufacture of lubricants, but for the present the production of edible fats and of soap-making materials is of paramount importance in the development of the process."

BENJ. E. PRITCHARD, Secretary.

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ST. LOUIS.

At the March 19th meeting of the St. Louis Branch, Dr. H. M. Whelpley presented a paper on "How the Pharmacopœia is Revised." The paper was discussed by Francis Hemm, Leo Suppan, Julius C. Hoester, William Thaler, Carl T. Buehler, Miss Lydia Batdorf and J. W. Mackelden.

JULIUS C. HOESTER, Secretary.

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WASHINGTON.

The City of Washington Branch held its regular monthly meeting at the National College of Pharmacy, Wednesday, February 24, 1915; the subject for discussion was the Harrison Law and the regulation for the enforcement of same.

Mr. P. S. Talbert, Chief of the Law Division of the Internal Revenue Bureau; Dr. B. R. Rhees, who has immediate charge of the enforcement of the law, and Dr. O. B. Adams, Chief Chemist, Internal Revenue Bureau, were present and discussed the law and the regulations from the view-point of its enforcement.

After going into the history of what led up to the enactment of the law by Congress, Mr. Talbert gave figures showing that the annual importation of opium, its salts and derivatives for the past 10 years had been about eight times more than what is required for legitimate medicinal purposes and that of cocaine and its salts more than double all conservative estimates as to legitimate requirements. The Harrison law was discussed as to the manner of its enforcement by the Internal Revenue Bureau and he said he felt sure that highly desirable results would follow and develop the way for improvements in the future. He further expressed himself as highly gratified with the hearty coöperation of the trade generally.

Dr. Hubbard, chief of the division, that drafted the regulations, was unable to be present and his place was filled by Dr. Rhees, who made an explanation of the regulations as they affected every branch of the trade as well as the physician, dentist and veterinarian, external preparations were classed as those which were applied to the skin only and that did not come in contact with the mucous membranes whatever. The provisions with reference to registration, order blanks and inventories were so carefully gone into that there should be no question of doubt as to their provisions and what is required.

Dr. Adams spoke with reference to synthetic substitutes and explained that same could be considered from both a chemical and therapeutic standpoint, but what would be done with this question remained to be considered and determined later when regulations would be promulgated.

The members present participated in the discussion that followed and many points of value to physician and pharmacist were brought out. Joel Blanc made a strong argument in favor of a thorough trial of the law in every particular before any endeavor be made looking to amending same as has been already suggested. Dr. Kebler spoke along the same lines, and further said that the Bureau of Chemistry was in possession of much information that would be of much value to the medical fraternity if the facts were known, particularly in regard to the indiscriminate sale of habit-forming drugs in unexpected places in all of the large cities.

Dr. Henry P. Hynson took a most active part in the meeting and made a plea in closing the meeting that the indiscriminate sale and use of habit-forming drugs had long had a tendency to bring disrepute to both medicine and pharmacy and that both professions now had the opportunity, by making only slight sacrifices, to purge their ranks of such charges and elevate their respective professions. His remarks along the lines of compiling accurate records were most timely, and he made many suggestions of value as to the handling the stock of narcotics. He further stated that the law could not help but prove a blessing to physicians and pharmacists as well as a boon to humanity in curtailing the indiscriminate sale and use of habit-forming drugs.

S. L. HILTON, Secretary.

The March meeting of the City of Washington Branch was held March 24, 1915, at the National College of Pharmacy. The subject for discussion was the "Effect of the Harrison Law on the Pharmacy Act of the District of Columbia," by Mr. Alex. Muncaster, Professor of Pharmaceutical Jurisprudence, National College of Pharmacy.

His opening remarks, while usually correct, do not seem to fit in this particular case.

"Man whose privileges are curtailed by any law usually know more about the law than otherwise."

From the numerous questions that have been asked and the many inquiries made of the Internal Revenue Bureau and those connected with the drafting of the law, it would seem that this is not correct, for the reason that those affected have deferred considering this law until the same went into effect.

After taking up both Acts and discussing the main features of each as pertaining to the use and sale of narcotics, he clearly demonstrated by citing numerous court decisions relating to other laws, which would establish precedents sufficient, that both Acts could and would work in connection with each other without friction and that nothing contained in the Pharmacy Act of the District of Columbia had been repealed by the Harrison law.

Prof. Muncaster, further explained many sections of the Harrison Act and the regulations from a legal standpoint, that did much to clear the minds of those present. He said that numerous clauses of the law were apparently not as clear as was at first supposed, and that they would in the future require interpretation by the courts. As for instance, what are "synthetic substitutes?" Does this phrase apply to Cocaine, its salts or alpha or beta eucaine or any of their salts or simply to alpha and beta eucaine and their salts?

The requirement that the physician, dentist and veterinary surgeon keeping records shall state the name and address of the patient seems not to meet the situation of the veterinarian, should this not have provided that the kind of animal should be stated instead of the name and address? Then if this latter only is done, would it fulfill the requirements of the law?

The question as to whether a pharmacist should fill a prescription that was legitimate in every way and complied with the provisions of the law and regulations, for one ounce of morphine or a large amount of any narcotic drug coming within the provisions of the Act was discussed from every view-point, the opinion expressed was, that the law contained nothing whatever to prevent the pharmacist from so doing if all of the requirements had been complied with, it would, however, no doubt cause the Internal Revenue Bureau to make inquiries and scrutinize the said physician, who would be compelled to show that the same was in the legitimate practice of his profession and not for the use by *habitues*, if in this he failed he then would be amenable to the Act and would be liable to fine and imprisonment.

The opinion as expressed by the Deputy Commissioner of Internal Revenue relative to the procedure to be followed in the selling or disposition of a business licensed under the Harrison law was also presented, it is as follows:—

"A retail dealer desiring to dispose of his entire business, should notify the Collector of Internal Revenue of this fact and the purchaser of such business should make a sworn inventory of the narcotic drugs coming into his possession and keep this on file in his place of business.

Previous to the transfer of such drugs, the purchaser should make application to the Collector for registration and the order forms he will require. The purchaser cannot make use of the order forms in the possession of the person from whom he purchases the business.

The purchaser should, upon receipt of his registry number and official order forms, make use of one of the order forms, in securing the transfer of the narcotic drugs and file the duplicate order form with his inventory.

When such transfers are contemplated, application should be made to the Collector of Internal Revenue for permission to make use of the larger size order forms, provided by the government upon which to itemize the narcotic drugs to be transferred."

Not the slightest objection was raised as to this ruling, every one present believing some such method should be followed.

Considerable discussion of minor importance relative to the Harrison law and many questions were asked that were thoroughly explained and did much to assist in carrying

out the provisions of the law, after which the meeting adjourned.

The subject for discussion at the April meeting will be, "The quality of some drugs and pharmaceutical preparations examined in the Bureau of Chemistry," by Dr. L. F. Kebler. This should be a most interesting meeting and it is expected that conditions of a startling nature will be shown as to the quality of drugs on the market.

H. E. KALUSOWSKI, President.
S. L. HILTON, Secretary.

College and Society

UNIVERSITY OF ILLINOIS SCHOOL OF PHARMACY.

The annual Commencement of the University of Illinois School of Pharmacy (Chicago College of Pharmacy) will be held at the new Central Music Hall, 64 E. Van Buren Street, Chicago, on Wednesday afternoon, April 28th. Professor Joseph Price Remington, Dean of the Philadelphia College of Pharmacy, will deliver the address to the graduating class. President Edmund J. James will confer the degrees. The indications are that the graduating class of 1915 will be the largest in the history of the school.

In the evening of the same day the Alumni Association will give a banquet in honor of the graduating class. A feature of this banquet will be the reunion of the classes of 1890, who will celebrate their twenty-fifth anniversary.

The annual meeting and election of officers of the Alumni Association will be held at the School on Tuesday evening, March 25th, when the arrangements for the annual banquet will be made.

The members of the senior class have had the pleasure of listening to a course of six lectures upon pharmaceutical law given by Mr. Walter A. Murray. Mr. Murray is a graduate of the school, Class of 1906, and also a graduate of law school. He was able, therefore, to present the subject from the pharmacist's viewpoint and the students were very much pleased with the results of his effort. This is the first time that such a course has been given at the School, but it is planned to continue it as a regular part of the curriculum.

THE JERSEY CITY COLLEGE OF PHARMACY.

The series of secial lectures at the Jersey City College of Pharmacy were continued on Friday, March 19th, when Dr. John Roemer, of White Plains, N. Y., delivered a splendid address on "Scientific Pharmacy" to the students of the College.

The lecturer gave a historic review of the growth of the manufacturing chemical and pharmaceutical industry, and the evolution of the dispensing doctor and the corresponding retrogress in retail pharmacy. He deplored the existing conditions in pharmacy and he severely criticised the constant growth of the "Patent Medicine" evil.

Dr. Roemer furthermore spoke on the many new laws which affect pharmacy and which not only act as safe-guards to the public health, but which furthermore place a great many restrictions and frequently unnecessary restrictions upon legitimate pharmacy. In spite of all these drawbacks the lecturer expressed the opinion that pharmacy will shortly undergo a great evolution and that scientific pharmacy is bound to come sooner or later. He advised the students of the College of Jersey City to make use of their pharmaceutical knowledge which they obtain during their course, in their future life as pharmacists. The utilization of this knowledge will gradually open up a field which at the present time has been unexplored, namely, that of Scientific Pharmacy.

The lecture was well attended by the students and the members of the Faculty of the College, and also by a number of visitors of the pharmaceutical and medical profession in Jersey City and vicinity.

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THE COLLEGE OF PHARMACY, STATE UNIVERSITY OF IOWA.

On February 19th, Dean Wilber J. Teeters read a paper before the Baconian Club on the subject of Narcotics and Dope. He discussed the source, composition, official and other preparations of habit-forming drugs, and explained the attempts at the legal control of the sale of these drugs. In the latter the Harrison Act was discussed. Dean Teeters had specimens of many of the so-called patent medicines which contain habit-forming drugs to illustrate his paper. After the usual colloquium the paper was discussed at length by

members of the faculties of the Colleges of Medicine and Dentistry.

Dr. F. M. Barta, '06, has been elected President of the Cedar Rapids Branch of the Bohemian National Alliance of America. Dr. Barta is also a graduate of the College of Medicine and is at present located at Cedar Rapids, Iowa.

A very comprehensive paper on the subject "Vanilla," by Prof. R. A. Kuever, appears in the February issue of the Ice Cream Trade Journal. It is a detailed account of the nature and source, origin, habitat and distribution of vanilla beans; commercial varieties, and methods of preparing—artificial or synthetic vanillin, Vanillism; Adulteration—imitations and artificial extracts; Definition—legal investigations; standards of analysis.

This paper was given as a lecture before the annual convention of the Association of Ice Cream Manufacturers of Iowa, and also before the annual Convention of the Nebraska Association of Ice Cream Manufacturers. The former convention was held in Des Moines and the latter in Omaha.

Dean Teeters was called to Omaha a short time ago to act as a member of a visitation committee for the American Conference of Pharmaceutical Faculties at Creighton College of Pharmacy. Other members of the committee were Prof. Caspari of the St. Louis College of Pharmacy and Dean Koch of the Pittsburgh College of Pharmacy, Chairman of the Executive Board of the Conference. Prof. Koch was a guest for a day at the home of Dean Teeters before returning to Pittsburgh.

The Pharmacist and the Law

SALE OR PRESCRIBING OF POISONS. MORPHINE—"LEGITIMATE USE."

Kentucky Acts, 1912, c. 86, makes it an offense for any registered pharmacist or licensed physician to prescribe for, procure for, or sell or dispense to any person opium or its alkaloidal salts or their derivatives or any admixture containing opium or its alkaloid salts or their derivatives, or otherwise deal in the same for any purpose other than for "legitimate use," under a penalty of a fine of not less than $20 nor more than $100. An indictment was returned under the statute against a regularly licensed and practicing physician, for prescribing morphine for a purpose other than for a legitimate use. The circuit court sustained a demurrer to the indictment, on the ground that it failed to charge that the morphine prescribed for and sold to the purchaser by the defendant, was an alkaloid or derivative of opium or an admixture containing opium, and the court could not judicially know or say that such was its character. On appeal, the appellate court said that, while morphine was not named in the statute, as an alkaloid, derivative or admixture of opium, it did not suppose there was a person, of ordinary intelligence or common understanding, residing in the state, but has familiar knowledge of its power as a narcotic, its deadly effect as a poison, and that it is an alkaloid or derivative of opium. The word "morphine" has as well-defined a meaning as the word "whisky" and its qualities and effects, are as well known to the generality of the people of the state, as are those of the intoxicant called "whisky"; and manifestly it would be a work of supererogation to allege in an indictment charging one with the unlawful sale of whisky, that it is a spirituous liquor or intoxicant. It was therefore held that the validity of the indictment was not effected by its failure to state that the morphine sold was an alkaloid or derivative of opium.

The defendant also insisted that the failure of the statute to define the words "legitimate use" rendered it void for uncertainty. In other words, it was argued that the statute fixed no standard, by which the physician in selling or dispensing opium, its alkaloidal salts or derivatives, is enabled to know what use of it by the purchaser would or would not be legitimate. The court, however, followed Katzman v. Commonwealth, 140 Ky., 124, 130 S. W., 990, where it had under consideration the validity of Section 2630, Kentucky Statutes, which regulates the sale of certain poisons by retail, and declares, in substance, that a sale or delivery of such poison shall not be made by any person, without satisfying himself that the poison is to be used for legitimate purposes, without defining the words "retail" and "legitimate purposes." A prosecution, instituted by warrant, against Katzman for violating this statute, resulted in his conviction, and he sought a

reversal of the judgment on the ground that the statute was void for uncertainty, because it failed to define the words quoted. The court held, however, that the statute was not void on this ground. It said, "It may be admitted that, although the meaning of the words 'retail' and 'legitimate purposes,' as used in the statute, are reasonably well-understood, it is nevertheless possible that there might be difference of opinion as to whether, in a given state of case, the sale of a drug was by retail or for a legitimate purpose, and it is possible that in administering this statute, it may occasionally happen that a druggist will be accused, who claims not to know what constitutes a sale by retail, or what is a legitimate use of opium; and it is also possible that different trial courts and juries may not always be harmonious in the conclusions reached upon this point. But the fact that there may be occasional doubt or want of agreement on this question cannot be allowed to invalidate the statute."

The opinion then proceeded to state that a person who has intelligence enough to conduct a drug store, could not fail to know what would constitute the selling of a drug by retail or to understand the meaning of the words "legitimate purposes" as used in the statute; that the druggist must, as declared by the statute, first satisfy himself that the sale of the drug or poison, is for a legitimate purpose; and that, if he, in fact, does not know the purpose for which the poison is to be used, or has any doubt about it, then he must, in good faith, exercise reasonable care to find out the purpose for which it is bought. "The statute," it was said, "was intended to regulate sales by druggists, and when it is sought to apply the words 'legitimate purposes' to a sale of drugs or poisons by druggists, they have a technical meaning that may not be clearly known or understood by courts or jurors, and so it is permissible to allow experts to give evidence as to what is regarded by qualified druggists and physicians as legitimate purposes for which sales may be made, so that the trial court and jury may be informed as to what is recognized as a legitimate purpose, for which these drugs may be sold by those intrusted with their sale, and to whom, in a measure, is confined the knowledge as to what constitutes a sale for legitimate purposes."

The court held that this reasoning must control in the construction to be given the words "legitimate use." The word "legitimate," in the statute, was not used in its original sense of *lawful,* but in its secondary sense of *proper* or *warranted,* as when we speak of a "legitimate conclusion," or a "legitimate argument." Morphine is sold for legitimate purposes, under the statute, when, under the facts, a druggist or doctor, acting according to the ordinary usage of the profession, and exercising ordinary care, would have made the sale. This, it was held, was a question for the jury. The judgment was therefore reversed, and the cause remanded for further proceedings.

Commonwealth v. Garhart, Kentucky Court of Appeals, 169 S. W., 514.

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ADULTERATION—ICE CREAM DEFICIENT IN BUTTER-FAT.

In proceedings for selling ice cream deficient in butter fat in violation of the Pennsylvania Ice Cream Act March 24, 1909, it is held that the title of the act, reading, "An act for the protection of the public health and to prevent fraud in the sale of adulterated or deficient ice cream, fixing a standard of butter-fat for ice cream," gives sufficient notice of the contents of Section 4, which provides that "no ice cream shall be sold within the state containing less than seven *per centum* of butter-fat, except where fruits or nuts are used for the purpose of flavoring, when it shall not contain less than six *per centum* of butter-fat." The act was held to be within the police power of the state, though ice cream below the standard set, is not injurious to health. Ice cream, it was said, enters so largely into the food supply of the public, as to have become a proper subject of legislation, especially in view of the opportunities which its manufacture affords to practice imposition. In the popular understanding, it is largely composed of milk of which butter-fat is an important constituent. If by the exercise of ingenuity, and by the practice of unwarranted thrift, a product can be put upon the market having the name and appearance of ice cream, but lacking the chief element which gives it value as an article of food, a large opportunity would be afforded to dealers in that article to profit by deception, and it is the opportunity for such deceit of which the police power takes notice and seeks to take away. "It has been the policy of this state," said the court, "to legislate on the sub-

ject of milk and milk products, and statutes have been enacted which made it unlawful for any person to sell milk which contained less than a fixed percentage of butter-fat and less than a fixed percentage of mixed solids, making it unlawful to sell cream which contained less than a fixed percentage of butter-fat which classified cheese and fixed the percentage of butter-fat which the various classes of cheese should contain; and similar legislation has been enacted in other states. Legislation of a like character is found in the act of May 21, 1901 (P. L. 275), forbidding the sale of vinegar which contains less than four *per cent.* of absolute acetic acid. If the sale of pure milk containing less than three and one-fourth *per cent.* of butter-fat may be prohibited, it is not apparent why the same principle does not apply to ice cream. Milk is a natural product—wholesome and useful for food. The milk of many cows contains less than three and one-fourth *per cent.* of butter-fat. The owners of such cattle have a constitutional right to sell the product of their dairies; but this right has been held to be subordinate to the public welfare, and this welfare demands that a fixed minimum standard of butter-fat shall exist in the whole milk sold in this commonwealth. The known disposition of some dealers to cheat, and the opportunity afforded them by the absence of some regulation of the business, is the justification of such legislation under the police power." Although the dairy and food commissioner was specially charged with the enforcement of the provisions of the act, it was held that a prosecution thereunder need not be commenced by him, but may be brought by any citizen.

It was shown by the evidence that a pint of ice cream for the sale of which the defendant was prosecuted had been analyzed and found deficient in butter-fat. It was held not error to exclude the evidence of experts to show that samples taken from other parts of the same can might show different percentages of butter-fat.

Commonwealth v. Crowl, Pennsylvania Supreme Court, 91 Atl. 922.

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FOOD AND DRUGS ACT—"ADDED" DEFINED—MISBRANDING.

In a proceeding to condemn a quantity of a syrup called Coca Cola on the ground that it was adulterated and misbranded, the Circuit Court of Appeals made the following rulings. Forfeiture was claimed under the Federal Food and Drugs Act. It was held that the word "added" in section 7 of that act, declaring that an article shall be deemed to be adulterated if it contain any added poisonous or other added deleterious ingredient which may render the article injurious to health, implies the existence of a standard, and an element necessarily used to create a standard is not added. If caffeine was the addition to Coca Cola, as the complainant claimed, what was the base? For 15 years before the passage of the act, Coca Cola had been an existing article of food. It was a compound; it had no distinctive base (unless water, by reason of its larger proportion); it was made up of water, sugar, caffeine, phosphoric acid, glycerine, lime juice, coloring matter, flavoring matter and "merchandise No. 5." The test that whether the deleterious ingredient is "added" is whether this ingredient is in its natural or in an artificial form may often be a useful aid in applying and inferpreting the statute, but it cannot be applied where artificially compounded foods are under consideration. In construing clause 5 of section 7, it is necessary to consider section 8 of the act, providing that an article of food which does not contain any added poisonous or deleterious ingredient shall not be deemed to be adulterated or misbranded, in specified cases, and when so construed, the act requires a standard before there can be any added ingredient or adulteration.

The act, it is held, makes no distinction between compounds known at its date and those thereafter devised, but it does not absolutely forbid the use in any compound of any element that a jury may call deleterious. Congress, having selected and regulated the use of those things known to be particularly dangerous, has not wholly forbidden other things from which no serious danger need be anticipated. The word "added" may be construed as being used with reference to a possibly deleterious food ingredient beyond the quantity in which the ingredient is normally found in usual or customary articles of food, and no such ingredient should be considered as added, provided it is present only in the quantity in which it existed in common articles of foods generally known. So construed, caffeine is not an added deleterious ingredient of Coca Cola.

The compound known as Coca Cola was held not to be misbranded, the name being a

distinctive name of the product of the manufacturer thereof and of nothing else. "Coca" is indicative of one article, and "Cola" of another distinct article, and the combination was not descriptive of any substance or combination known until adopted by the manufacturer, and is still unknown as an appelation for any other substance on the market.

United States v. 40 Barrels and 20 Kegs of Coca Cola, C. C. A., 215 Fed. 535.

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IMPURE FOOD SERVED BY RESTAURANT KEEPER—REMEDY OF GUEST.

Action was brought against restaurateurs for damages for the injurious consequences of eating a dish of "creamed sweetbreads" in the defendants' restaurant. It was alleged that the food was "sold" to the plaintiff, and that its sale was attended with the implied warranty that it was wholesome and fit for consumption. The case being made to rest upon the existence of implied warranty of quality, if there was no such implied warranty there could be no recovery. The defendants contended that the furnishing of food to a customer by restaurant keepers does not constitute a sale, and that therefore there was no implied warranty.

A restaurant keeper, it was held, differs from an innkeeper in that he furnishes only food, or food and drink, and not lodging or shelter. In so far as the character of the service performed by a restaurant keeper and innkeeper to their respective patrons is concerned, it is the same. In neither case does the transaction, in so far as it involves the supply of food or drink to customers, partake of the character of a sale of goods. The essence of it is not an agreement for the transfer of the general property of the food or drink placed at the command of the customer for the satisfaction of his desires or actually appropriated by him in the process of appeasing his appetite or thirst. The customer does not become the owner of the food set before him, or of that portion which is carved for his use, or of that which finds a place upon his plate, or in side dishes set about it. No designated portion becomes his. He is privileged to eat, and that is all. The uneaten food is not his. He cannot do what he pleases with it. That which is set before him or placed at his command is provided to enable him to satisfy his immediate wants, and for no other purpose. He may satisfy these wants; but there he must stop. He may not turn over unconsumed portions to others at his pleasure, or carry away such portions. The true essence of the transaction is service in the satisfaction of a human need or desire —ministry to a bodily want. A necessary incident of this service or ministry is the consumption of the food required. This consumption involves destruction, and nothing remains of what is consumed to which the right of property can be said to attach. Before consumption title does not pass; after consumption there remains nothing to become the subject of title. What the customer pays for is a right to satisfy his appetite by the process of destruction. What he thus pays for includes more than the price of the food as such. It includes all that enters into the conception of service, and with it no small factor of direct personal service. It does not contemplate the transfer of the general property in the food supplied as a factor in the service rendered.

In no other case does there appear to have been made an attempt to recover for the harmful consequences resulting from unwholesome food or drink supplied by the keeper of an inn, restaurant, or boarding house in the line of his business upon the strength of an implied condition or warranty of quality. Those which have grown out of a sale by a dealer are not in point. There being no implied warranty as contended for, the court said that the remedy of a guest at a restaurant injured by impure food served to him must probably be based on the negligence of the proprietors.

Merrill v. Hodson, Connecticut Supreme Court, 91 Atl. 533.

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WHERE POSSESSION OF COCAINE A MISDEMEANOR.

North Carolina Laws, 1913, c. 81, Sec. 2, makes possession of cocaine by a person other than a physician, dentist, veterinary surgeon or druggist, unless obtained *bona fide* on a prescription, a misdemeanor and declares possession *prima facie* evidence of violation of the statute. It is held that the finding by an officer, of cocaine in large quantity in a secret scuttle-hole, covered by a picture, over a kitchen door, in a house rented and occupied by the defendant, is sufficient to establish possession within the statute.

State v. Ross, North Carolina Supreme Court, 83 S. E. 307.

Changes of Address

All changes of address of members should be sent to the General Secretary promptly.

The Association will not be responsible for non-delivery of the Annual Volume or Year Book, or of the JOURNAL unless notice of change of address is received before shipment or mailing.

Both the old and the new address should be given, thus:

HENRY MILTON,
From 2342 Albion Place, St. Louis, Mo.
To 278 Dartmouth St., Boston, Mass.

Titles or degrees to be used in publications or in the official records should be given, and names should be *plainly* written, or typewritten.

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KIMLEL, J. E.,
From 1018 Glendale Ave., Peoria, Ill.,
To 1708 N. Madison, Peoria, Ill.

PARKER, G. R.,
From 22 Pocasser Ave., Providence, R. I.,
To 22 Pocasset Ave., Providence, R. I.

PIERCE, I. H.,
From Salem, Ia.,
To Pullman, Wash., care Wash. Agri. College.

FAUNDO, E. G.,
From Monte 497, Havana, Cuba.
To 529 Cerro St., Havana, Cuba.

DAILEY, JOS.,
From Ft. McIntosh, Laredo, Texas,
To residence unknown.

NEVILLE, ARTHUR,
From Pettit Barracks, Zamboanga, P. I.
To residence unknown.

TYSON, L. RAYMOND,
From Homdale, Idaho,
To Midvale, Idaho.

BEMIS, R. E.,
From 7 Concord Sq., Boston, Mass.,
To 46 Maverick Sq., East Boston, Mass.

HORSTMANN, G.,
From 14 Mt. Vernon Ave., Mt. Vernon, N. Y.,
To 136 S. 8th Ave., Mt. Vernon, N. Y.

REDFERN, E. S.,
From State House, Lincoln, Neb.
To Dairy and Food Commission, Des Moines, Ia.

DADD, R. M.,
From 22 Grand Ave., Milwaukee, Wis.
To 137 Grand Ave., Milwaukee, Wis.

HARRIS, SAMUEL,
From F. H. & A. C., No. 2, Presidio, San Francisco, Cal.
To 3131 Washington St., San Francisco, Cal.

BURGHEIM, JACOB,
From 1019 Congress Ave., Houston, Texas,
To 209 Main St., Houston, Texas.

MAYER, PETER,
From 19 W. Main St., Marshalltown, Ia.
To 111 W. State St., Marshalltown, Ia.

DECEASED SINCE FEB. 18, 1915.

BEXTON, E. M.,
Omaha, Neb.

REINSTATED SINCE FEB. 18, 1915.

GILBERTSON, L. S.,
Snohomish, Wash.

FISCHER, RAY O.,
Jefferson, Wis.

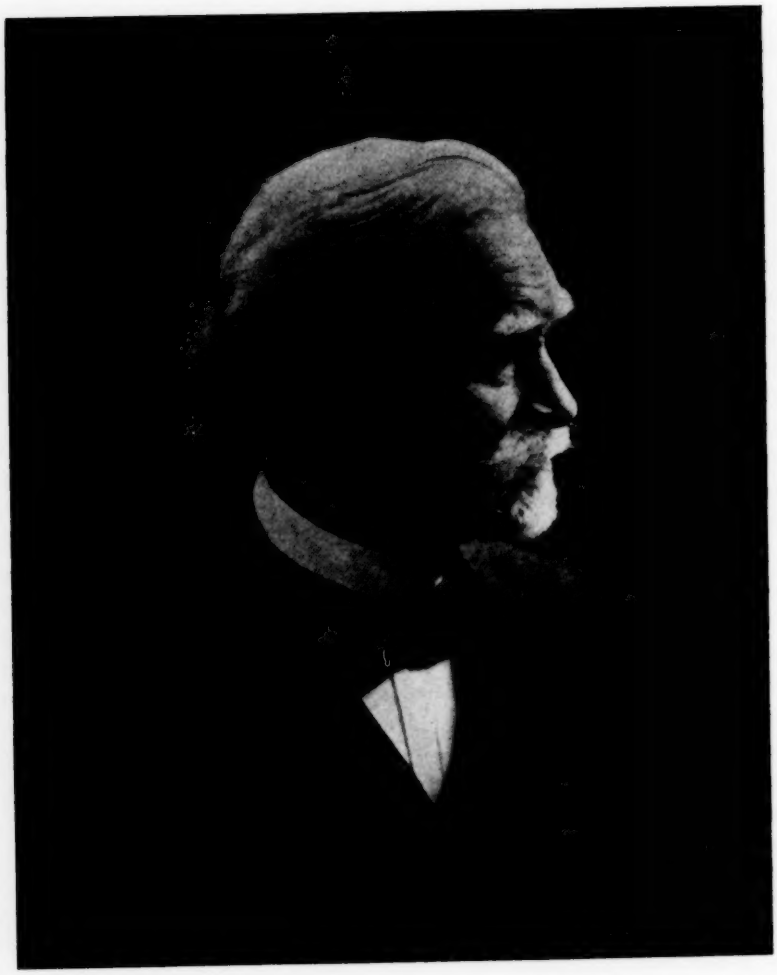
A NEW INSECTICIDE.

"Para-dichlorobenzene" is a chemical compound only recently used as an insecticide, but which, in being noninflammable and comparatively inexpensive, possesses advantages over other fumigants. The United States Department of Agriculture's new bulletin (No. 167) is entitled, "Para-dichlorobenzene as an Insect Fumigant," and points out that the compound, although deadly to insects, is harmless to human beings under ordinary conditions, and does not have an odor which clings to fabrics, as do many insecticides.

Para-dichlorobenzene is a colorless crystalline substance which evaporates very quickly as a vapor, if exposed. It costs 15 cents per pound in barrel lots.

Albert Benjamin Prescott

Albert Benjamin Prescott was born at Hastings, N. Y., December 12, 1832, and died at Ann Arbor, Mich., February 25, 1905. When nine years old he had a fall which made him an invalid for several years, thus making him dependent upon an older sister and private tutors for his early education. For some time he was correspondent for the New York Tribune and later taught in the public schools near his home. In 1860 he entered the medical department of the University of Michigan and graduated in 1864. He at once entered the federal army as assistant surgeon, and was later appointed the chief surgeon of the Jeffersonville Medical Hospital. At the close of the war he returned to Ann Arbor as assistant professor of chemistry, being advanced to a full professorship in 1870. Later he received the degree of doctor of philosophy and the honorary degree of doctor of laws. At the organization of the school of pharmacy in 1868 he was elected professor of pharmacy; in 1876 he was made dean, a position which he filled until his death. He was president of the American Pharmaceutical Association in 1899-1900, president of the American Association for the Advancement of Science in 1901, a member of the United States Pharmacopœial Convention from 1880 to the time of his death, and contributing editor of the Druggists' Circular, 1884-1886. He deserves distinction as a benefactor of pharmacy during the past half century, although not a pharmacist in the ordinary acceptance of that word. It was his steadfast stand for higher and better pharmaceutical education and ethics that places him high among those that have benefited the calling.



ALBERT BENJAMIN PRESCOTT, 1832-1905